

DOCUMENT RESUME

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ABSTRACT

This unit, designed for use in the primary grades (K-3), focuses on the farm and its functions. The various aspects of farming are discussed from an ecological and environmental point of view through such topics as soil, plants, animals, machinery, production of food, job opportunities, and the future of the farm. There is also a comparison of the farm and the city and the value systems operating in each of the two environments. The unit includes the behavioral objectives and the expected student criteria for evaluation, pretests and posttests for each targeted grade level, suggested methodologies and sequence for teaching each concept, relevant background information, suggested field trips, patterns for student worksheets, a list of appropriate films, and a bibliography for additional teacher resources. (MLB)

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ENVIRONMENTAL ECOLOGICAL EDUCATION PROJECT

Parkway School District
Chesterfield, Missouri

DR. WAYNE FICK, Superintendent
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Unit: The Farm - Its Function and Future
Revised June 1972

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SE 018 230

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SETTING

This unit on the farm is best suited for use in the primary grades, K-3. The farm and its functions are very much a part of the American way of life. Farmland can be found outside the suburban areas and is at times the land connecting cities. Farms are the food-producing areas of America. They can range in size from a few acres to several thousand acres. Consideration will be given to the different types of farms and their purposes. In discussing the farm, many factors such as the farmer and his family, soil, plants, animals, machinery, and the future of the farm will be brought into focus.

This unit is somewhat different from other units on the farm. All aspects of farming will be discussed from the ecological and environmental viewpoint. At various times throughout the unit, it is suggested that the teacher point out the interrelationship of two environments, FARM-CITY, and compare their value systems.

CONCEPTS

Suggested
Level for
Teaching

The Farm

- | | |
|-----|---|
| K-3 | I. The farm is a food-producing area for man and animal. |
| K-3 | II. The farm family shares in the responsibility of farm production throughout the year. There are many opportunities for involvement for each member of the farm family. |
| K-3 | III. Some farms produce crops; some produce livestock; some produce both. |
| 2-3 | IV. Some farms specialize in animal production and some in plant production. |

Soil

- | | |
|-----|---|
| K | V. Good soil is needed for growing crops. |
| 2-3 | VI. Formation of the soil determines the types of soil. |
| 2-3 | VII. Different types of plants grow in different types of soil and climate. |
| K-3 | VIII. Plant food, water, erosion of the soil, and sunlight all have their effect on plant life. |

Plants

- | | |
|-----|---|
| K-3 | IX. Farmers have special types of work for each season of the year. |
| K-3 | X. The parts of a plant are the root, stem, leaf, and flower. |
| 2-3 | XI. Plants grow from different beginning forms: seeds, bulbs, and plant cuttings. |
| 2-3 | XII. Insects, insecticides, soil, fire, and weather affect plant life. |
| 2-3 | XIII. Consumers are affected by the plants they eat. |
| K-3 | XIV. Flowering plants and shrubs are used to improve the appearance of farm surroundings. |

Suggested
Level for
Teaching

Animals

- | | | |
|-----|-------|---|
| K | XV. | The farmer raises livestock for food and/or market. |
| 2-3 | XVI. | If not controlled, infested animals may transfer diseases to human beings. |
| 2-3 | XVII. | The economics of the dairy farm is affected by weather, modern technology, and vandalism. |

Machinery

- | | | |
|-----|--------|--|
| 1-3 | XVIII. | Early farm tools ranged from very crude tools to work animals. Modern farm tools have evolved from these simple tools. |
| K-3 | XIX. | On a farm each machine has a special function or functions. |
| 2-3 | XX. | Safe use and proper care of the machinery are important factors. |

Farm of the Future

- | | | |
|-----|-------|---|
| 2-3 | XXI. | The future farm will require modern machinery and technology. These will affect the animal life, natural environment, and the consumer. |
| 2-3 | XXII. | The farm of the future will benefit from ecological information that is being gathered today. |

Careers

- | | | |
|-----|--------|--|
| 2-3 | XXIII. | There are many jobs associated with farming. |
|-----|--------|--|

BEHAVIORAL OBJECTIVES

The teacher will have to modify the suggested behavioral objectives according to the grade level of the class.

Concept Number (* grades 2 and 3 only)

- I. 1. After discussing farms as food-producing areas for man and livestock, all the students will draw a farm showing areas of production and products. One plant and one animal used as food for man will be included.
- II. 2. At the end of the unit, all the children should match a job with a member of a farm family to show how each member of the farm family shares in the responsibility of farm production.
- III. 3. After discussing different types of farms, their care and environment, seventy-five percent of the students will draw a picture (K-1), or choose from a list of words that relate to (2-3), six different types of farms in the United States.
- IV. 4. After discussing specialized farming, including animal production and plant production, all the students will illustrate (K-1) or list (2-3) six types of specialized farms; three in plant production and three in animal production.
- V. 5. After discussing the importance and use of soil, all the children in the class will choose soil as the best place for a plant to grow.
- VI.* 6. After discussing the types of soil, eighty percent of the students will identify types of soil from a word list.
- VII.* 7. All the children will match one plant, the type of soil it grows in, and the climate that is needed to foster its growth.
- VIII. 8. All the children will identify the conditions necessary to help a plant's growth.
- IX. 9. Upon completion of the discussion of the farmer's responsibility at each season of the year, all the students will draw a picture illustrating the activity of the farmer in spring, summer, fall, and winter.
- X. 10. Upon completion of a discussion of the parts of a plant, all the students will be able to draw a plant including the roots, stem, leaf, and flower in their pictures.

Concept Number

- | | | |
|--------|-----|--|
| XI.* | 11. | After discussing, examining, and planting seeds, bulbs, and plant cuttings, all of the students will recognize pictures of the three common methods by which plants reproduce. |
| XII. | 12. | Upon completion of the unit, all of the students will be able to describe in writing how one of the following affects plant life: insects, insecticides, soil, fire, or weather. |
| XIII.* | 13. | Upon completion of the unit, seventy-five percent of the students will describe in writing one way in which plants or plant products affect consumers. |
| XV. | 14. | At the conclusion of a discussion on the farmer as a producer, all of the students will be able to correctly choose from a series of pictures of domestic and wild animals those raised by farmers for food and/or market. |
| XVI.* | 15. | After discussing the role of the United States Department of Agriculture, eighty percent of the class will list at least two ways in which this department protects the health of human beings from animal diseases. |
| XVII.* | 16. | At the end of the unit on dairy farms, seventy percent of the class will list at least three ways in which factors such as weather, vandalism, and mechanical failures have an effect on the economics of a dairy farm. |
| XVIII. | 17. | After discussing historical background of tools, seventy-five percent of the children will be able to identify at least 3 early farm tools and their present-day counterparts. |
| XIX. | 18. | After discussing specialized farm machinery, seventy-five percent of the children will be able to describe four farm machines and their function or functions. |
| XX.* | 19. | After discussing the care and safe use of farm machinery, all the children will recognize safety and care measures from a list of phrases describing precautions that should be taken and practices to be avoided. |
| XXI.* | 20. | After discussing and considering farms and farm machinery of the future, the children will name and explain how four types of farm machinery will have a good and/or bad effect on animal life, the natural environment, and the consumer. |

Concept Number

XXII.*

21. After a discussion of present-day farms and farmers, each child will be asked to hypothesize and substantiate in writing how he thinks the future farmer will benefit from the ecological information that is being gathered today.

XXIII.*

22. After discussing vocations related to farming, eighty percent of the children will be able to name two careers and explain their responsibilities.

PRE-POST TEST
KINDERGARTEN AND FIRST GRADE

These specific test questions have been formulated for grades K-1. Second and third grade students should not be required to answer these questions unless the teacher feels they are appropriate for her class.*

Tests should be given only for concepts taught, and each concept taught should be tested.

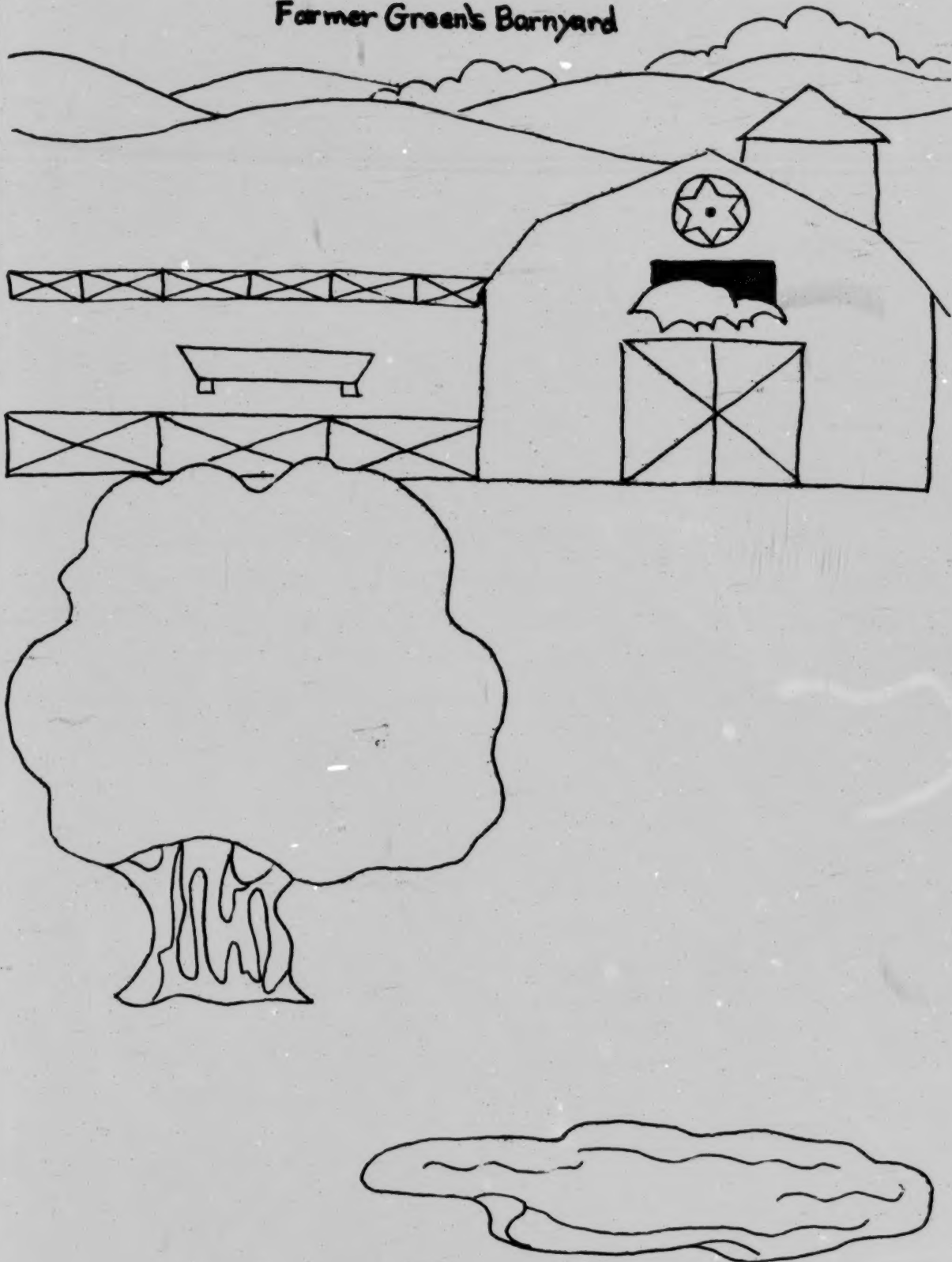
The children should be given a pre-test before teaching the unit, to determine the level of the student. The same test should be administered after the unit has been taught.

Concept Number

- I. Directions: After the student has completed the drawing, the teacher should question the child as to what each part of the picture is and write the response on the picture. This will serve as a record for later comparison with the post test. Also, the answers to the following questions (2-4) should be put on the same paper.
1. Draw, chalk, or paint a picture of a farm. Think of as many things as you can that you would find on a farm. I will give you a little help. (You may use the following outline picture of a farm if you wish.)
 2. Where would you find the farm?
 3. What type of plant life would you find.
 4. What kinds of tools or machinery would you find on the farm?

* A Pre-Post Test for second and third grade students follows on pages 16-19.

Farmer Green's Barnyard



Choose a family member from line 1 and write his name on the line.

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Line 1



FATHER

MOTHER

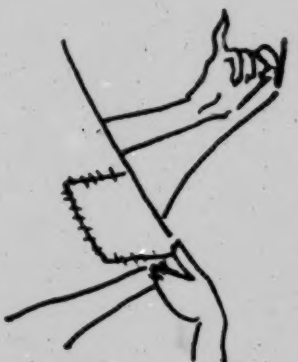
BROTHER

SISTER

Line 2



Line 3



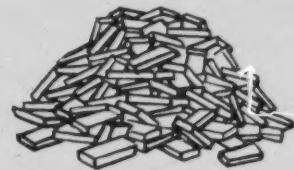
How many different kinds of farms can you draw?

Concept III.

Concept V.

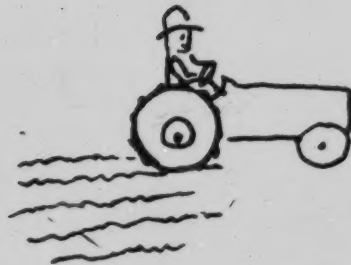
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Where would you plant a seed? Circle any picture that shows where a plant could grow.



Concept VIII

Circle the pictures that show those things that will help a plant to grow.



Draw pictures of how a corn plant looks in each season.

Concept IX

SPRING

SUMMER

FALL

WINTER

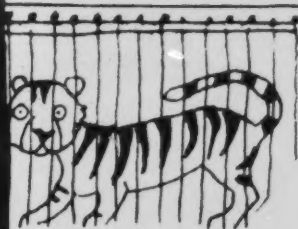
Concept X

Draw a picture of a plant in this way:

1. Draw a long green stem.
2. Draw 2 green leaves.
3. Draw some brown roots.
4. Draw a large red flower.

Put an X in the boxes that show the animals which the farmer raises for the market.

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tiger



hippopotamus



cow



pig



lamb



tulip



lion



elephant



whale



fox



camel



alligator



seal



bear



chicken



zebra



monkey



duck



14 kangaroo



turkey

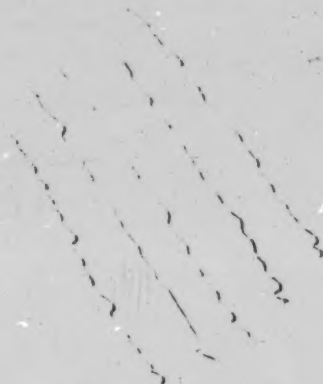
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concepts xvii - xviii

Write "old" or "new" in each box that shows a picture of farm machinery. Draw a line connecting the old machine with the new, and another to the product or job which the machine is used for by the farmer.



corn



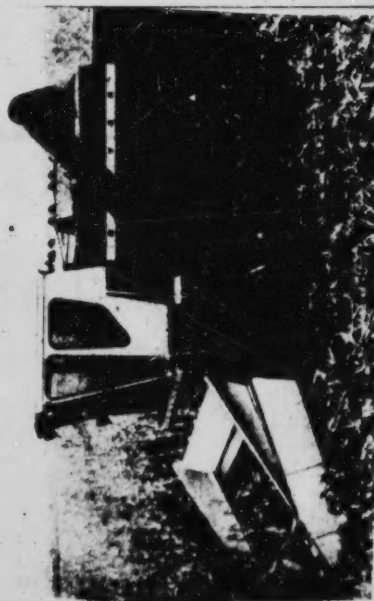
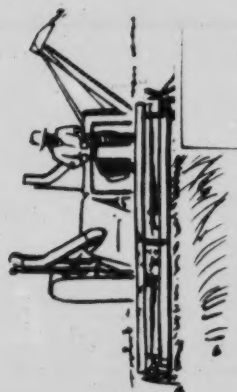
furrows



bale of straw



wheat



Pre-Post Test
Test 2. Grades 2 and 3

Concept Number

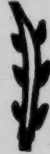
- I. 1. Draw a picture of a farm. Include two main products, one plant and one animal that come from a farm. Label the things you have drawn.
- I. 2. Where would you find a farm?
- II. 3. Match the names of the members of the farm family with the job or jobs they are most likely to perform.
- | | |
|---------|------------------------|
| Father | picking apples |
| | gardening |
| Mother | plowing |
| | feeding the chickens |
| Sister | canning |
| | taking cows to pasture |
| Brother | gathering eggs |
- III. 4. Farms vary according to production of crops and livestock. Underline the words that name the product for each category.

<u>CROPS</u>		<u>LIVESTOCK</u>	
combine	corn	herbicides	harrow
insects	irrigate	cattle	duck
barley	flax	plains	nursery
cultivator	consumer	churn	feed
oats	bean	grain	hog
soil	coffee	chicken	horse
barn	bushel	poultry	fruit
manure	cotton	harvest	rabbit
season	potato	sheep	soybean
sugar	acre	hoe	trough
rye	wheat	pasture	turkey

- IV. 5. List six types of specialized farms, three specializing in crop production and three specializing in animal production.

Concept Number

- VI. 6. From the following list underline those words which name types of soil:
- loam
dried leaves
clay
sand
swamp
- VII. 7. Draw arrows from the soil to the plant, then to the climate that are usually found together.
- | <u>Soil</u> | <u>Plant</u> | <u>Climate</u> |
|-------------|--------------|----------------|
| clay | fern | desert |
| sand | cactus | polar |
- VIII. 8. Fertilizers, sunlight, and water all have an effect upon plants in soil. Give the children a ditto sheet of the list below, instructing them to circle those things that would have a good effect on plants in soil, and to cross out those things that would not have a good effect.
- | | | |
|----------|--------|---------|
| rain | manure | wind |
| erosion | glass | paper |
| sunlight | hail | icicles |
| smoke | | |
- IX. 9. Draw a picture of the farmer doing the special work he must perform during each season.
- X. 10. Draw a plant. Show the stem, leaf, roots, and flower.
- XI. 11. Plants can grow from a bulb, a seed, or a plant cutting. Label each.
- 



- XII. 12. Insects, insecticides, soil, fire, and weather affect plant life. Choose one and explain in writing how it affects plant life.
- XIII. 13. Describe in writing one way consumers are affected by the farm plants they eat.
- XVI. 14. In your own words list at least two ways in which the United States Department of Agriculture protects the health of the human beings from animal disease.

Concept Number

- XVII. 15. The dairy farmer is a businessman. He is raising livestock to make a profit. Tell how each of the three factors listed below affect his profit:
- a. weather
 - b. modern technology (machinery or chemicals)
 - c. vandalism
- XVIII. 16. With a red crayon, circle each early, crude farm tool. With a blue crayon, frame each modern farm tool. Using a black crayon, draw a line from the early tool to the modern tool that has evolved from it.
- | | |
|-------------------|-------------|
| flail | disc harrow |
| cow (hand-milked) | milk parlor |
| work animal | tractor |
| hoe | combine |
- XIX. 17. In your own words describe the function of four of the following machines:
- cow parlor or milking machine
 - tractor
 - cotton picker
 - combine
 - corn picker
 - disc harrow
- XX. 18. Circle the phrases that describe safety practices while using farm machinery and proper care of the machines. Cross out the phrases that do not describe safety practices or good care.
- Oil the machinery
 - Let the machines sit out in the rain
 - Jump from machinery while it is running
 - Run in front of a tractor

Concept Number

- XX. 18. Carrying a first-aid kit on a tractor
cont. Inspecting machinery regularly
- XXI. 19. Some farm machines of the future will have good effects on animal life, the farm environment, and the consumer; others will have bad effects. It is possible for some things to have both a good effect and a bad effect. Name four different kinds of farm machinery that will have a good and/or bad effect.
- XXII. 20. Write a story about the farmer and his family in the year 2000. Take into consideration the food they may eat; water they may drink; economics; transportation; machinery; animals and their off-spring; buildings on the farms; crops they will grow; and the entertainment that will be available. Also consider weather, air, noise, pollution, and problems the farmer and his family may or may not face in the year 2000.
- XXIII. 21. List two careers related to farming and tell in one sentence about the responsibilities each career involves.

ANSWER KEY
PRE-POST TEST
KINDERGARTEN AND FIRST GRADE

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Concept Number

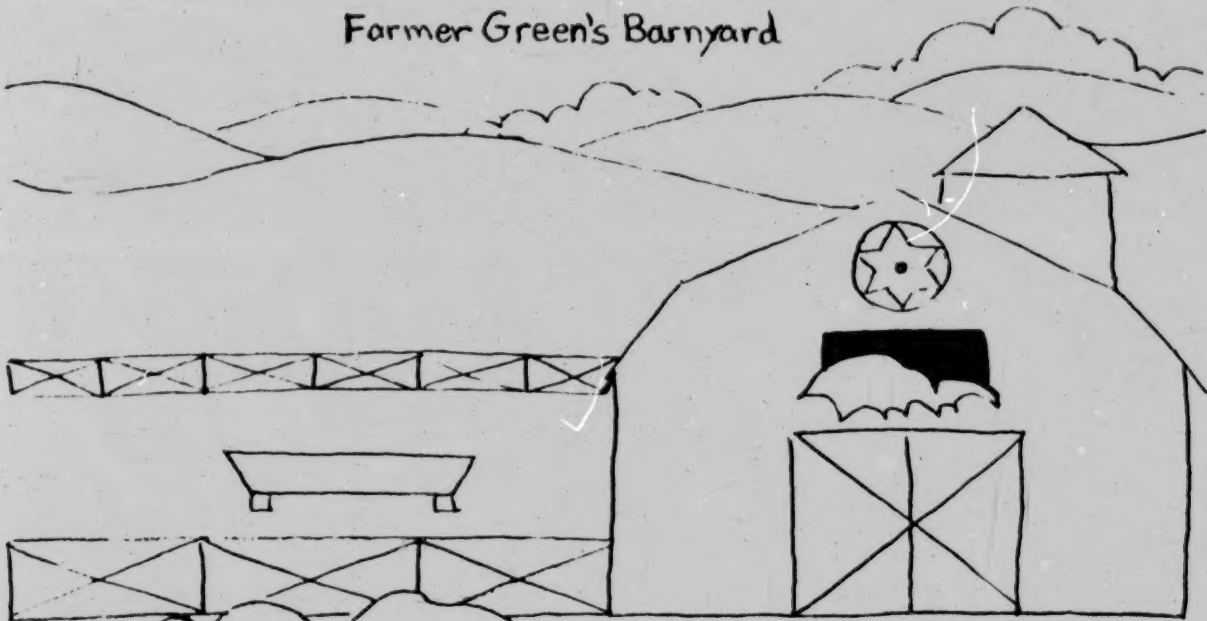
- I. Directions: After the student has completed the drawing, the teacher should question the child as to what each part of the picture is and write the response on the picture. This will serve as a record for later comparison with the post test. Also, the answers to the following questions (2-4) should be put on the same paper.

Possible Answers

- | | |
|--|---|
| 1. See following outline pictures. | 1. Draw, chalk, or paint a picture of a farm. Think of as many things as you can that you would find on a farm. I will give you a little help. (You may use the following outline picture of a farm if you wish.) |
| 2. In the country, out of the city, name of area as Fenton, open country, etc. | 2. Where would you find the farm? |
| 3. Wheat, corn, lots of food, etc. | 3. What type of plant life would you find. |
| 4. Tractor, plow, hammer, combine, rake, etc. | 4. What kinds of tools or machinery would you find on the farm? |

* A Pre-Post Test for second and third grade students follows on pages 16-19.

Farmer Green's Barnyard



Answers will vary.
Possible pictures:

ducks on pond

pigs at trough

cow in field

silo

farmer

tractor, etc.



What other member of the farm family might do these jobs in rows 2 and 3?
 Choose a family member from line 1 and write his name on the line.

Concept 11.

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line 1



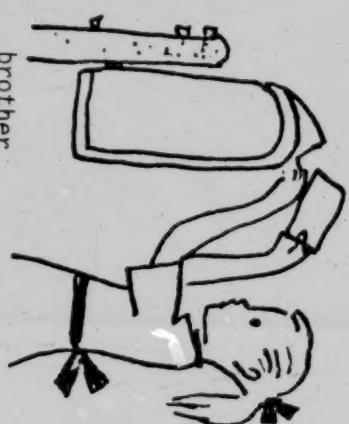
FATHER

MOTHER

BROTHER

SISTER

line 2



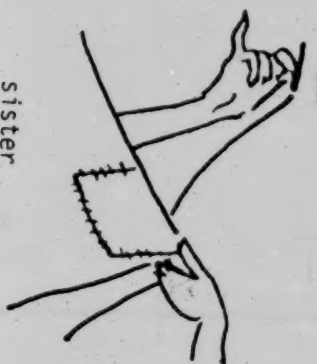
sister, brother, or father

brother

father

brother

line 3



sister

sister

sister

brother

How many different kinds of farms can you draw?

Answers will vary.
Possible answers:

Type of farm

ranch
truck farm

livestock
grain

orchard

poultry

dairy

general farm

What might be in picture

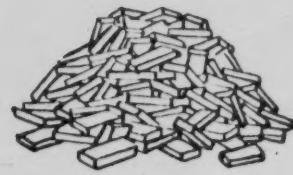
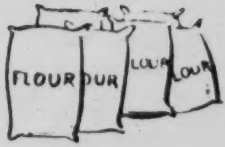
cowboys, cattle
truck, baskets of
fruits or vegetables,
people picking fruit
cattle, branding time
taking harvest in
with tractor, grow-
ing grain
fruit on trees or in
baskets, people
picking
chickens, turkeys,
feeding poultry,
nest with eggs

milking a cow, cows
in pasture, truck
coming for cans of
milk
any ideas from above
farms

Concept V.

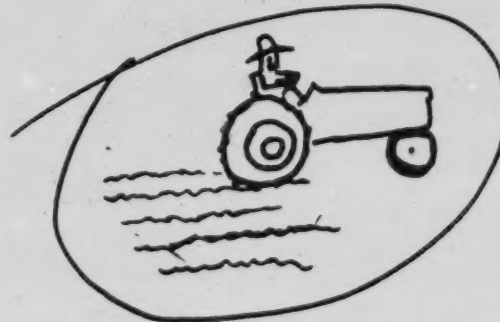
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Where would you plant a seed? Circle any picture that shows where a plant could grow.



Concept VIII

Circle the pictures that show those things that will help a plant to grow.



Draw pictures of how a corn plant looks in each season.

Concept IX

Seed or seedlings

Tall and dark green with tassel

SPRING

SUMMER

Tall; ears pointing down, golden brown

Harvested field; stalks bent over

FALL

WINTER

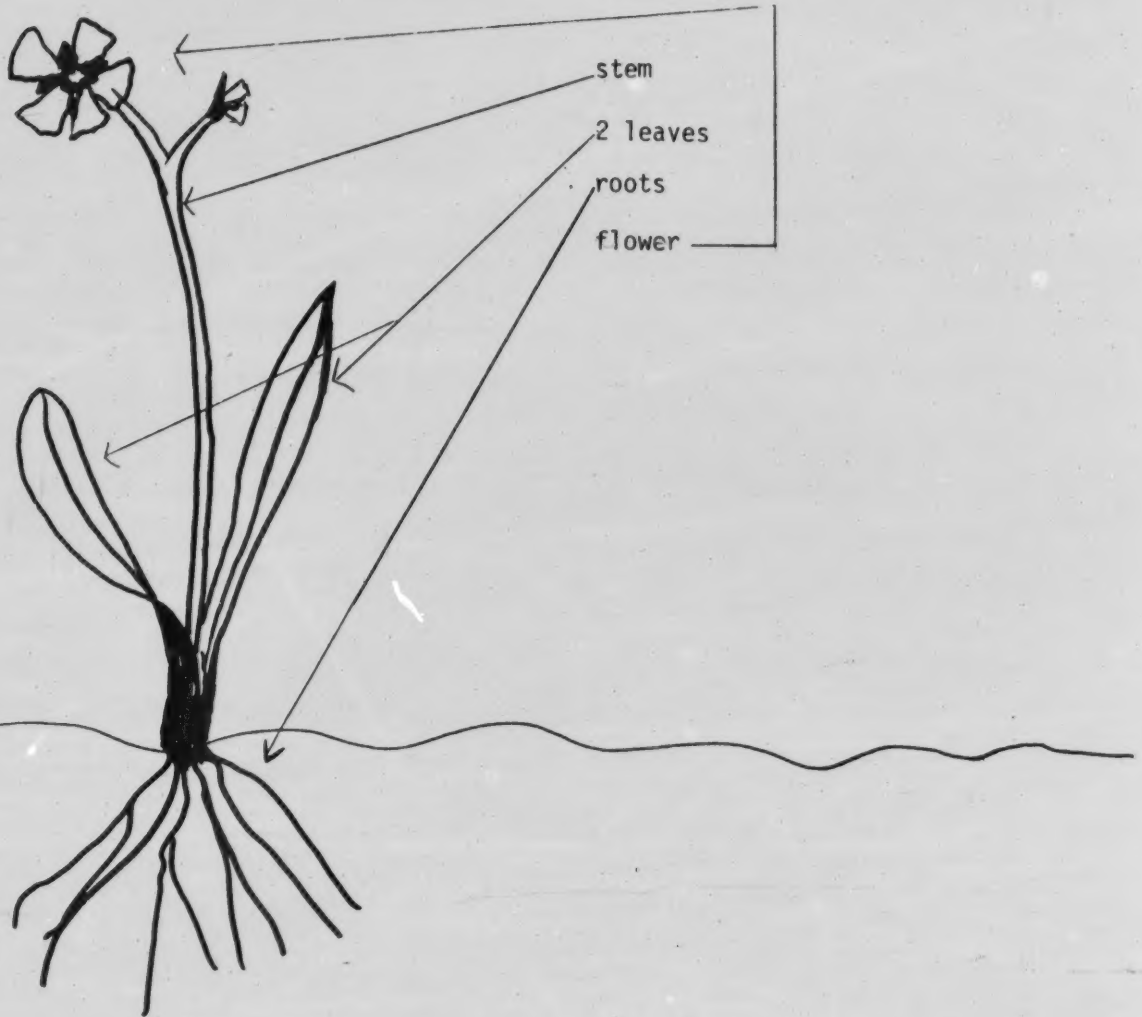
Concept X

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Draw a picture of a plant in this way:

1. Draw a long green stem.
2. Draw 2 green leaves.
3. Draw some brown roots.
4. Draw a large red flower.

Responses will vary but each student's picture should include:



CONCEPTS AND

Put an X in the boxes that show the animals which the farmer raises for the market.

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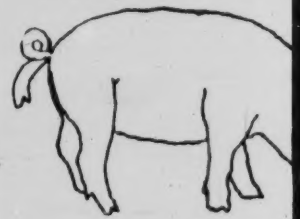
tiger

☐


hippopotamus

☐


cow

☒


pig

☒


lamb

☒


tulip

☐


lion

☐


elephant

☐


whale

☐


fox

☐


camel

☐


alligator

☐


seal

☐

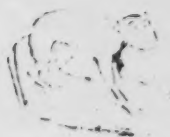

bear

☐


chicken

☒


zebra

☐


battery

☐


duck

☒


kangaroo

☐

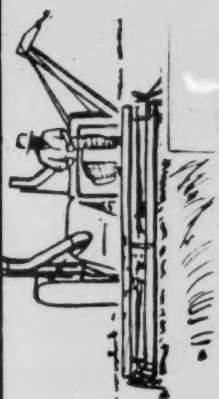

turkey

☒

Concepts XVII - XVIII

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Write "old" or "new" in each box that shows a picture of farm machinery.
Draw a line connecting the old machine with the new, and another to the product or job which the machine is used for by the farmer.

 corn	 furrows	 bale of straw  wheat
 new	 new	 new
 old	 old	 old

Answer Key
Pre-Post Test
Test 2. Grades 2 and 3

Concept Number

I.

1. Draw a picture of a farm. Include two main products, one plant and one animal that come from a farm. Label the things you have drawn.

I.

2. Where would you find a farm? A tract of land large enough for a farmer to produce a product or products.

II.

3. Match the names of the members of the farm family with the job or jobs they are most likely to perform.

Answer #3

The purpose of this question is to show sharing of responsibility in as many areas as possible. The child should match more than two jobs for each family member. He should realize that different kinds of farms, different ages, and different situations would alter the

III.

kinds of jobs each person would have.

Father

picking apples

Mother

gardening

Sister

plowing

feeding the chickens

Brother

canning

taking cows to pasture

gathering eggs

4. Farms vary according to production of crops and livestock. Underline the words that name the product for each category.

CROPS

LIVESTOCK

combine

corn

herbicides

harrow

insects

irrigate

cattle

duck

barley

flax

plains

nursery

cultivator

consumer

churn

feed

oats

bean

grain

hog

soil

coffee

chicken

horse

barn

bushel

poultry

fruit

manure

cotton

harvest

rabbit

season

potato

sheep

soybean

sugar

acre

hoe

trough

rye

wheat

pasture

turkey

IV.

5. List six types of specialized farms, three specializing in crop production and three specializing in animal production.

Answer #5

Crop Farms

orchard
truck gardening
nursery
grain farm

Animal Farms

sheep
ranch
poultry farm
dairy farm

Concept Number

- VI. 6. From the following list underline those words which name types of soil:

loam
dried leaves
clay
sand
swamp

- VII. 7. Draw arrows from the soil to the plant, then to the climate that are usually found together.

<u>Soil</u>		<u>Plant</u>		<u>Climate</u>
clay	→	fern	→	desert
sand	→	cactus	→	polar

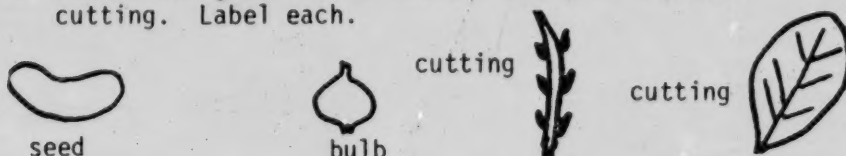
- VIII. 8. Fertilizers, sunlight, and water all have an effect upon plants in soil. Give the children a ditto sheet of the list below, instructing them to circle those things that would have a good effect on plants in soil, and to cross out those things that would not have a good effect.

<u>rain</u>	<u>manure</u>	~~wind~~
~~erosion~~	glass	paper
<u>sunlight</u>	~~hail~~	~~icicles~~
~~smoke~~		

- IX. 9. Draw a picture of the farmer doing the special work he must perform during each season. Answers will vary.

- X. 10. Draw a plant. Show the stem, leaf, roots, and flower. Answers will vary. Sample picture on pg. 26.

- XI. 11. Plants can grow from a bulb, a seed, or a plant cutting. Label each.



- XII. 12. Insects, insecticides, soil, fire, and weather affect plant life. Choose one and explain in writing how it affects plant life. Answers will vary, refer to information on pages 42 and 43 in Background Information.

- XIII. 13. Describe in writing one way consumers are affected by the farm plants they eat. Answers will vary, refer to information on pages 43 and 44 in Background Information.
- XVI. 14. In your own words list at least two ways in which the United States Department of Agriculture protects the health of the human beings from animal disease.

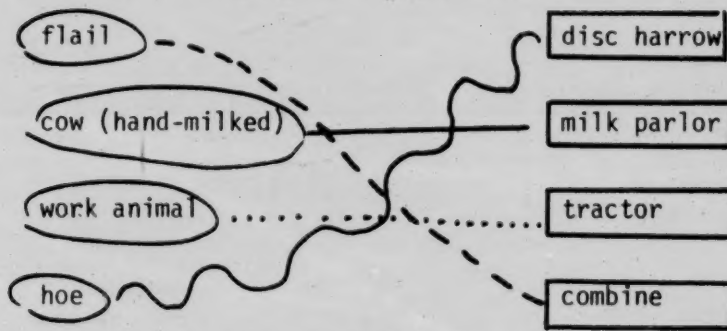
- a. Meat
b. Farm Magazine Advisory

Concept Number

XVII. 15. The dairy farmer is a businessman. He is raising livestock to make a profit. Tell how each of the three factors listed below affect his profit:
Answers will vary, refer to information on page 46 in Background Information.

- a. weather
- b. modern technology (machinery or chemicals)
- c. vandalism

XVIII. 16. With a red crayon, circle each early, crude farm tool. With a blue crayon, frame each modern farm tool. Using a black crayon, draw a line from the early tool to the modern tool that has evolved from it.



XIX. 17. In your own words describe the function of four of the following machines: Answers will vary, refer to information on pages 48-49 in Background Information.

cow parlor or milking machine

tractor

cotton picker

combine

corn picker

disc harrow

XX. 18. Circle the phrases that describe safety practices while using farm machinery and proper care of the machines. Cross out the phrases that do not describe safety practices or good care.

Oil the machinery

Let the ~~machines~~ sit out in the rain

Jump from ~~machinery~~ while it is running

Run in front of ~~a~~ tractor

Concept Number

- XX. 18. Carrying a first-aid kit on a tractor
Inspecting machinery regularly
- XXI. 19. Some farm machines of the future will have good effects on animal life, the farm environment, and the consumer; others will have bad effects. It is possible for some things to have both a good effect and a bad effect. Name four different kinds of farm machinery that will have a good and/or bad effect.
Answers will vary, refer to information on pages 49-51 in Background Information.
- XXII. 20. Write a story about the farmer and his family in the year 2000. Take into consideration the food they may eat; water they may drink; economics; transportation; machinery; animals and their off-spring; buildings on the farms; crops they will grow; and the entertainment that will be available. Also consider weather, air, noise, pollution, and problems the farmer and his family may or may not face in the year 2000. Answers will vary, refer to information on pages 49-51 in Background Information.
- XXIII. 21. List two careers related to farming and tell in one sentence about the responsibilities each career involves. Answers will vary, refer to information on page 52 in Background Information.

VOCABULARY LIST

acre
agriculture
air
alfalfa
animal
auction
bacteria
bale
barbed wire
barley
barn
bean
bedrock
branch
bud
bulb
bushel
calf
cattle
cattle shed
chick
chore
churn
clipping
coffee
combine
conservation
consumer
cooperative
corn
corn crib
corn stalk
cotton
county fair
crop
crop dusting
cultivate
damage
disease
diversified
drill
drought
duck
duckling
earth
ecology
energy
environment
erosion
expand
export

feed
feeding corral
feedlot
fence post
fertile
fertilizer
flail
flax
flock
flood
florication
flower
food chain
fruit
glacier
gosling
grain
graze
harmful
harrow
harvest
hemp
herbicide
herd
horticulture
humus
hydroponics
Ice Age
import
insect
irrigate
irrigation
leaf
lichen
livestock
loam
manure
market
meadow
milking machine
mineral
mowing machine
natural resource
nutrition
oat
pasteurized
pasture
pesticide
piglet
plain
plantation

plant
planting
plow
poison
pollution
potato
poultry
producer
product
pump
rake ranch
reaping machine
recycling
rice
ripe
rooster
root
rye
salt block
scarecrow
scythe
season
separator
seed pod
seed
share-cropper
sheep
silo
silt
slaughter house

slop
slope
smoke house
soybean
spray
sprout
stem
subsidized
subsoil
sugar
technology
temperature
threshing machine
topsoil
toxic
tractor
transportation
trough
truck
truck farming
trunk
tumbleweed
uproot
vegetable
waste material
weathering
weed
well
windmill

BACKGROUND INFORMATION

Concept

I

Man's first act probably was to forage for food in order to exist. Throughout thousands of years man has had to provide for himself the necessities of life: food, clothing, and shelter. Man has had to learn how to work with soil, plant life, weather, insects, natural resources, and disasters in order to produce food for man and livestock.

There was a time when most of the people lived on farms and raised just enough produce for their own use. When one piece of land did not produce sufficiently, they moved on and planted crops on another location. Now one farm family on the same ground must produce enough food for itself and several other families who, in turn, are producing something or rendering some service for the farmer.

Today's farmer works hard and leaves little to chance. The modern farmer operates his farm as a business. For many families farming is a well-paying business. They sell their crops and livestock for money just as other kinds of businessmen sell their products. Some farms cover hundreds even thousands of acres. These huge farms produce tons of food every year. Some plantations (farms or estates in tropical or semi-tropical regions, on which crops are cultivated by resident laborers) produce vast crops of coffee, fruit, sugar, etc. Many large ranches raise cattle or sheep by the thousands. But, for many farmers, farming is a hard way of life, which is not always profitable.

Mechanical and scientific discoveries have both directly and indirectly changed the nature of farming.

Understandably farming today is highly commercial and market-oriented. Nearly all farm output, except some feed and crop seed, goes through commercial channels. Even in low-income areas, farmers supply only a part of the meat, chicken, eggs, and milk needs for their own use, and not much else. Most farm families buy their food from the supermarket because it saves work in preparation, being more convenient and sanitary.

Today's farmer knows what is wanted and produces commodities according to specifications, such as formula-fed broilers of a specific age and weight, hatchery eggs, cattle bred to an exact weight and finish, wheat with a minimum of protein.

The traditional "farmer's market" where many products were sold directly to the consumer from the farm at a roadside stand, has all but disappeared. Fruits and vegetables are now harvested, sold, and delivered in truckload lots directly to wholesalers. Poultry and meat animals are sold alive, directly to slaughtering plants, county auctions, or country buyers, or are consigned to commission-selling houses.

Who are the farmers? Most farmers in the United States and Canada are farmer's sons. The farmer owns the farm on which he grew up. As a boy he helped with the chores and often drove the tractor after school. By the time he was in his teens, he was working side by side with his father in the fields. Most farmers learn all their farming skills from actually

performing farm tasks. Many study basic farming methods in high school and some attend agricultural colleges. There they learn the latest methods of growing crops, raising animals, and managing a farm. After graduation from high school or college, most young farmers return to live and work on the family farm. The farmer and his father incorporate the new farming methods that the son has learned at school. By the time the father retires, his son has married. The son and his family take over the farm.

An American farm with enough land, livestock, and machinery to support a family costs at least \$125,000. A typical farm in the midwest covers about 350 acres of fertile prairie land. This is an area equal to roughly 125 square city blocks. On one side of the farm there may be a brook with many kinds of trees along its banks. The farm buildings are usually grouped together at a corner of the farm near the road. The farm family lives in a comfortable, oil-heated house. The home usually has one or more telephones and radios, and a television set. The kitchen has a modern stove and electric refrigerator. A large freezer stands in the basement. The lawn may be equipped with a barbeque pit and a jungle gym. Near the house are the barn and silo (an airproof, towerlike structure in which fermenting green fodder is preserved for future use), cattle shed and feeding corral, garage, machine shed, corn cribs, and chicken house. Further away are low buildings that serve as winter shelters for the hogs and sheep. The farmer has many machines. They may include two tractors, a disc plow, cultivator, mowing machine, hay baler, seed planter, cornstalk chopper, corn cob shucker, and sprayer. For travel and hauling, the family uses both a station wagon and a pick-up truck.

The farmer may raise several kinds of animals for market. These can include some 40 beef cattle, 50 hogs, 50 sheep, and 250 chickens. The farm family probably has pets: a pony, a dog, and several cats.

Concept
II

A farm is a busy place throughout the year as the farmer and his family must do some chores every day. Each season calls for special work in growing crops and raising livestock. The hogs, sheep, and cattle need fresh food and water. The farmer's wife usually cares for the chickens and gathers the eggs. The children help clean and inspect the eggs and pack them in cartons. Twice a week the eggs are delivered to regular customers.

Spreading livestock manure on the fields as fertilizer is an important chore during the fall, winter, and spring. Summer chores include mowing the lawn and weeding the flower beds and vegetable gardens. A special winter chore is "plowing out" snow after storms. The whole family helps in spring planting the alfalfa, corn, oats, and other major farm crops. Many new-born animals such as lambs and pigs are bottle-fed by the farm family when their mothers are unable to feed them. Some farm products are marketed in spring; for example a pig born one spring will be ready for marketing the following spring. The farmer's children have many jobs to do after school hours. One important job is caring for the baby chickens. They must be supplied with food, water, and heat both day and night. The chicks are bought when they are only a few days old. The children's hardest job is to help load seed and fertilizer into the truck.

Concept
IX.

Summer is the growing season for corn and harvest time for oats and winter wheat. The farmer's wife may be kept busy freezing beans, carrots, and peas, making pickles, and canning tomatoes. She has picked them all from her vegetable garden. Some lambs are shipped to market during this time.

Summer also affords time for picnics. On Sundays, after church, the family may have a barbeque in their backyard. In late July, August, or September the family enjoys at least one full day of fun at the county fair. The fair is an activity that usually takes place in a county close to the farm. The farmer's wife may want to display her best preserves or pickles, or a special quilt she has made to compete for prizes. The fair has a carnival atmosphere and is a day of fun.

Fall is the time for harvesting the corn and marketing the cattle. The children return to school but must help with the harvesting after school hours. After planting the winter wheat, the farmer carefully cleans and stores his machines.

Snow may cover the farm during most of the winter. The farmer may go to school to study new agricultural methods which will help him in his work. Most farmers belong to one or more national organizations that work to improve farm life. The three chief farm organizations are the American Farm-Bureau Federation, the National Farmers Union, and the National Grange. These groups work to promote laws to benefit the farmer. They also cooperate with government agencies in educational programs for farmers. The organizations have local chapters in many counties. These local groups hold regular meetings to determine what farmers think about the laws that affect farming. The organizations also conduct social activities for farm families. Most farmers belong not only to national farm organizations but also to various cooperatives. Farmer cooperatives are business organizations that are owned by the members. Some cooperatives buy or manufacture large quantities of the special supplies needed by farmers.

Most farm families take an active part in the life of their local community. The typical farm community is a busy town with churches, a school, and a business district. The children belong to the 4-H Club, which prepares them to study for careers as farmers in high school. Once in high school they join the Future Farmers of America. (It would be interesting at this point to compare the city family with the farm family. Take into consideration the farm as a business compared to other city businesses, the various jobs and the family responsibilities, homes the role the child plays in the family, organizations children and adults belong to, and family activities).

Concept
III.

Farms vary according to crops and livestock. Many farmers grow several kinds of crops and also raise livestock. Their farms are called diversified or mixed farms. These farms generally grow corn, hay, oats, and soybeans, and raise beef cattle and hogs. Other types of farming include dairy, dry farms, floriculture, fur, horticulture, hydroponics, nursery, plantation, sharecropping, and tree and truck farming.

The major crops raised in the United States are barley, beans, coffee, corn, cotton, flax, fruit, hemp, oats, potatoes, rice, rye, soybeans, sugar, vegetables, and wheat. The major types of livestock produced are cattle, chickens, hogs, sheep, and turkeys.

Concept
IV.

Some farms specialize in animal production and some in plant production. Farmers specialize in different kinds of farming in different regions. In deciding what kind of farming he should do, a farmer must consider (1) soil, (2) climate, (3) the price of one product in relation to other products, (4) transportation costs, and (5) the amount of labor and number of machines he can provide to work his land.

Concept
V.

SOIL

Soil is one of America's precious legacies. In the early pioneer days of our country land was available for just the asking. If a farmer ruined his soil he could always move further west and set up another farm on new fertile soil. Now, centuries later, man is cornered. There are no more farms to be given away; man has to be content with the farmland he has. In order to continue to be a prosperous nation, we must be more careful with our valuable resource, soil. Without soil there would be no food, and without food there would be no life.

There are fifty-eight million square miles of land surface in the world. Of this, six million square miles are under the Antarctic cap. We are then left with fifty-two million square miles, of which only ten million can be cultivated. The United States claims one and a half million square miles of this arable land, equal to an area about six times the size of Texas.

Concept
VI.

Soil did not always exist in all parts of the earth. Thousands of years ago North American was covered by ice. The rich soil in the northern part of our country is a heritage of the glaciers of the Ice Age. These glaciers moved down from the north, scraping off a great deal of soil that had been formed earlier in Canada. When the ice melted back, it left behind a great amount of soil.

Soil begins with solid rock. Rock can be broken down in several ways:

1. Temperature change can play a part in breaking up rocks.
2. Water can get into the cracks in rocks. Then, when freezing temperatures occur, the water expands, cracking and breaking up the rocks.
3. Trees help break up rocks. As the roots of the tree grow, cracks widen and pry off chunks of rock.
4. Lichen as they grow (an algae and a fungus living together) give off an acid which makes rocks crumble.

All these ways of breaking up rocks are called weathering. The shattering of rocks into small particles is only the first step in the making of soil. Moving ice, wind, running water, and waves also share in making soil.

In almost all soil used for farms or gardens there are at least two layers. From bottom up we have bedrock, subsoil, and topsoil. The topsoil is the most fertile layer. It has built itself from the subsoil below it. Subsoil consists mostly of rock particles. Topsoil contains humus, which is decayed living matter. Soil is made fertile by this decayed living material, which made part of the soil through the work of small, living organisms in the soil. The layer of topsoil usually measures several inches in depth and may have been thousands of years in the making. It is the topsoil in which crops grow well. Much of our topsoil consists of loam. Loam is made of sand, clay, silt, and humus. Soil cannot rightly be called loam unless it has a large amount of humus. Manure adds to the soil some of the valuable elements that were in the food the animals ate. In some places there are large deposits of minerals containing the elements that soil is likely to lack. These minerals can be crushed and spread on fields. Air, rain, and changes in temperature help make holes in the topsoil through which air and water can get down to help weather soil particles.

Topsoils are not all alike. One difference is in the size of the rock particles found in them. These particles are divided into three main groups according to size: sand, silt, and clay. No soil is made of entirely of particles all the same size. The proportion of large and small particles differs in various soils. Soils also differ in the amount of humus that is mixed with rock particles.

Soils vary in color. Their color depends somewhat on the color of the rock from which it was formed. Other factors are how much humus is present and how many minerals are present in the soil.

Concept
VII.

At this point it is well to consider how climate not only affects the kinds of food we raise, but also the kinds of plants and animals that are native to the area. Plant life differs from climate to climate. Cactus plants and the widely-spaced bunch grass of desert climates differ from the evergreen forests of the cold, northern climates. The oak and hickory forests of New England differ from the grass prairies of the midwest. Most food crops grow best in certain climates. Wheat thrives chiefly in areas that are neither too wet or too dry, have warm to hot summers and cool to cold winters. Most rice comes from areas with warm, rainy climates. Citrus fruits need a mild or warm climate.

Concept
VIII.

This study of soil would be incomplete without some mention of the crucial problem of soil erosion. Man-made soil erosion had its beginning in America when the first tree was chopped down in the forest. The first English settlers at Jamestown were not prepared for the life they faced in the wilderness. The method of agriculture that they knew was not suited for the soils and climate of the New World. Trees were chopped down, underbrush burned out, and ground dug up for planting. As more settlers came they hacked their way through great forests preparing ground for small patches of corn and beans. Pioneers moved across Ohio, Kentucky, Indiana, Missouri, westward to where the trees thinned out. Then there was nothing but grass: no trees, only thick grass and steady wind. This was the area of the Great Plains. And as the settlers bared the land to wind and rain, soil erosion followed. By 1800 there were many abandoned farms. Books were published on American agriculture but those who needed the books the most did not use them. By 1850 soil erosion in America had become a major problem.

There are two types of erosion: natural (geologic) and man-made. Natural erosion is the wearing away of rock and land surfaces by water, wind, ice, and gravity. We cannot do much about geologic erosion because it works slowly. Man-made erosion is the result of improper use of land and improper farming methods. It is caused by wind blowing soil from the fields which have been bared and over grazed grasslands, and by water running off artificially sloped land and carrying away the topsoil. There is something we can do about man-made erosion. Water can be controlled to prevent washing away of the soil. All lands should be protected from water runoff. Grass, throughout the years, has been recommended as a protection against water and wind erosion. Crop rotation in addition to fighting erosion also keeps the soil from wearing out.

PLANTS

Concept IX

Farmers have special work for each season of the year, especially in the growing of crops. Early spring is the time for planting crops. The farmer may plant alfalfa, corn, oats, or other major farm crops depending on the type of farm he operates. Late spring is the growing season for corn and harvest time for oats and winter wheat. After the corn breaks through the ground the soil between the rows must be broken up with a cultivator. Cultivating the corn helps to uproot the unwanted weeds. Many farmers spray pesticides on their crops to protect them from harmful insects and unwanted weeds. Summer is the time for harvesting many crops. Crops that have not been harvested in the summer will be harvested in the fall. The farmer picks his ripened corn, and stores it in the corn crib or sells it. During the winter the farmer plans his crops for the following year.

Concept X.

Since plants are a major part of many farms, an understanding of plant growth and development is important. The parts of a plant are the roots, stem, leaves, and flower. According to Edward Ortleb and Richard Cadice in the background information from The Teachers Guide to Plants and Animals, "Each part of a flowering plant carries out the process that the plant needs to live. The root, first part of a young plant to appear, grows downward into the soil or water. Its functions are: absorb water and minerals, anchor the plant, and store food made in the leaves. The stem has food and water carrying tubes. The functions of the stem are: hold leaves up to sunlight, convey water and minerals from the roots to the leaves, and carry food made in the leaves down to the roots. The function of the leaves are: make the food that the plants need to live, allow gases in the air to enter and different gases to leave the plant and allow water in the plant to escape into the air (this is called photosynthesis). The function of a flower is to produce seeds from which new plants can grow."

Concept XI.

Plants originate from different forms, such as seeds, bulbs, and plant cuttings. A bean seed can grow into a new bean plant that will look like the original plant. Plant bulbs and plant cuttings also grow into new plants that look like the original plant.

The parts of a seed are: seed coat, food for the "baby" plant, and the "baby" plant. The seed coat (the outside of the seed) splits open when the seed soaks up water and when the new plant begins to grow. The root is usually the first part of the plant to push its way out of the seed. Next a shoot or stem begins to push its way out of the seed. After the roots have grown downward and the stem upward, the leaves begin to appear on the stem.

Ortleb and Cadice, in the background information of their Teachers Guide to Plants and Animals, state: "Flowers are parts of certain plants that produce seeds. The pollen of the stamen of some flowers is carried to the pistil by insects. Other flowers rely on wind to pollinate them. The union of material from the pollen with that of the ovule in the pistil causes the ovule to grow into a seed. The pistil enlarges and becomes a fruit containing the seeds. Seeds are then produced when the sperm of the pollen unites with the eggs within the ovary. The fertilized eggs develop into seeds that will produce the next generations of plants. Plants produce in a great variety of sizes, shapes and colors. Some seeds are eaten by man. Many seeds are part of the diet of animals. Mature seeds of plants become separated from the parent plant and are dispersed. The scattering may be accomplished by wind, animals, or water. Wind-blown seeds usually have fluffy streamers and are light in weight. Some seeds have hooks or barbs that stick on passing animals, including the clothing of man. Other seeds are eaten by animals and pass through the digestive track and are left as droppings. Certain seeds are buoyant and are carried away by streams. These seeds may travel great distances by water."

Plants can originate from bulbs. According to Webster, "A bulb is a large underground plant bud or bud group from which a new plant (as a lily or onion) can grow."

Plants can originate from plant cuttings. Plant cuttings can be taken from a stem, part of the roots, or from a leaf. Some plants, such as geranium or pussy willow, are able to begin a new plant from pieces of a plant stem. When a section of the stem of a geranium or pussy willow is placed in water it begins to grow new roots.

Plants can grow from leaves. A leaf from the rex begonia can be the beginning of a new plant. Make slits in the edge of the leaf at junctions of large veins. Place the leaf, top surface down, on some damp sand. Cover the leaf with an inverted glass jar. New roots will begin to grow out from the slits.

Plants constitute one of the major forms of food for man. Man eats the roots of plants such as beets, carrots, radishes, potatoes, turnips, and parsnips. The stems of plants, such as celery and rhubarb, may be eaten. The leaves of plants such as cabbage, lettuce, spinach, mustard, endive, beets, and turnips are edible. Man eats the seeds of plants such as corn, peas, beans, peanuts, and sunflowers, and the flowers of plants such as broccoli and cauliflower.

Plants and plant parts provide us with many of the things that we use in our daily living. Different parts of plants are used to obtain different products. Roots are used for foods, seasoning (horseradish), medicines (sassafras, mandrake), candy (licorice, ginger), and dyes, syrup, sugar, rubber, flax, cinchona bark (quinine), ropes, turpentine, and wood are more products produced by stems of plants. Plant leaves provide us with food--lettuce, cabbage, spinach, and the beverage tea. Tobacco, spearmint, peppermint, sage, and thyme are more leaf products. In tropical climates, palm leaves and grasses are used in home building. Flowers, in addition to their beauty, are used in the making of perfume.

Fruits of plants have always been used by man. Seeds are used chiefly as foods--grains, beans, peanuts, chocolate, and cocoa. Spices, various uses of the soybean are additional products from seeds.

Concept
XII.

The growth of a plant is determined by the environment in which the young plant finds itself. According to a group of authors in The Earth: Its Living Things the very best or optimum condition for most plants include at least optimum temperature, light, moisture, soil conditions (mineral acidity) and aeration (amount of air in the soil) for that specific plant. An organism can live only in the environment for which it has structures that enable it to carry on its functions. Organisms are best adapted to the special environment that permits them to survive and grow at their optimum. If one or more factors in an environment are missing or limited in some way, the organism is limited in its growth. It may even be limited in its ability to survive at all.

Since one crop farming and larger fields are the past and the present type of farming practices, insects have increased. Ortleb and Cadice say, "Insects are the most successful invertebrate animals found on the earth. They have adapted to a variety of habitats. The chief characteristics of the insects are three main body parts -- head, thorax abdomen, six legs on the thorax, and two antennae. Many insects form the chief kind of food for other animals." Some insects, the "good" insects, eat the insects that harm or destroy a farmer's crops. However, when a farmer plants a large field with only one kind of crop he may get a large number of insects that like that crop. Thus when a farmer plants a large field with one crop he is increasing the number of crop eating insects. Therefore, the farmer that wants a greater yield from his crop or crops will spray the crops with insecticides. But, not all crops can be sprayed. Insecticides should not be used on some crops at specific stages of their growth.

According to a special issue titled "Guidelines for Citizen Actions on Environmental Problems" published by the Conservation Education Association, they state: "DDT, Dieldrin, Lindane, Chlordane, Heptachlore, Endrin, Aldrin, BHC, 2, 4, 5, T, Toxaphene or any compound containing lead, mercury, or arsenic are dangerous and should not be used under any circumstances." They further state that, "Poisons are intended for pests -- not people -- but both are affected. Chemical poisons should not be used for pest control unless absolutely essential for health or economic reasons. Chemical poisons should never be used for nuisance pests such as midges or mosquitoes. Never dispose of insecticides by emptying into a water supply -- the substances eventually find their way into streams and lakes -- and even the ocean."

According to the Conservation Education Association, some safety practices that one should follow when using insecticides are:

1. Use only recommended dosages.
2. Use at the proper time of the year.
3. Check labels carefully.
4. Don't rely too much on printed material listing recommended pesticides. Such materials change rapidly because these chemicals are constantly being tested and evaluated.
5. Avoid direct contact with the pesticides used.
6. Apply carefully.

According to the Conservation Education Association, some safety practices that one should follow concerning plants and plant products are:

1. Plant for variety.
2. Remove dead or diseased plants.
3. Don't be too "picky" in the market.
4. Discourage the use of herbicides on roadside vegetation.

Soil is part of the environment that affects plants. "Good" soil for a plant is the proper type and contains all the minerals needed for maximum growth of the plant that depends upon it. If a plant does not have the right type of soil with sufficient minerals, the plant may live, but be poorly developed.

Fire affects plant growth and development. The need for fire protection and prevention is great. According to the Missouri Conservation Department in their booklet, Forest Fire in Missouri, "Fire damages pastures by burning the dried grass and litter with eventual destruction to the organic matter in the soil and surface erosion. The soil becomes poorer, the good grasses die out and the unwanted weeds take over the land. Fire does not reduce the number of insects. Fire encourages the development of insects, invites the insects to enter burned trees and ground, and destroys the homes of the natural enemy of insects; the birds."

There are several major causes of forest fires in Missouri. They are: debris burning, incendiary, smokers, campers, machine use, lightning, and miscellaneous which includes fireworks and children playing with matches.

Concept
XIII.

Consumers of plants are affected by the farm plants they eat. When a cow eats wild onions, her milk will have the taste and smell of the onion. However, one may not taste chemical compounds from insecticides in food. But, they may be present and in a highly concentrated form. According to the First Annual Report of the Council on Environmental Quality, "Some pollutants, which may be thinly spread throughout the environment, tend to concentrate in natural

food chains. Pesticides tend to diffuse in ocean water. The physical effects of one pound of a well mixed pesticide in 10 billion pounds of water may seem negligible. But many sea animals filter out particular kinds of chemical compounds, including pesticides and collect them in certain parts of their bodies at concentrations far higher than in the water in which they live. Algae may concentrate some component of a pesticide which is then concentrated further in the fish that eat the algae. In turn, still further concentrations may occur in the birds that eat the fish. When the accumulation of the toxic substances reaches a high enough level it may kill the organism directly or interfere with its reproduction."

The Council further states that, "Air pollution inflicts widespread and costly damage on plant life. Some experiences of the past warned of the effects of air pollution on plant life. Today, the damage to plant life is less dramatic than in the days of unrestricted smelter operation. But, the slower, chronic injury inflicted on agricultural, forest, and ornamental vegetation by increasing quantities and varieties of air pollutants has now spread to all parts of the country."

"Smog in the Los Angeles basin contributes to the slow decline of citrus groves south of the city and damages trees in the San Bernardino National Forests 50 miles away. Fluoride and sulfur oxides, released into the air by phosphate fertilizer processing in Florida, have blighted large numbers of pines and citrus orchards. Livestock grazing on fluoride -- tainted vegetation develop a crippling condition known as fluorosis. In New Jersey, pollution injury to vegetation has been observed in every county and damage reported to at least 36 commercial crops."

LIVESTOCK

Diversified farms have a variety of crops and livestock. The dairy farmer's "harvest" is the milk from the cows he raises. Ranches are generally farms where beef cattle, or sheep are raised. Poultry farms are the chief producers of chickens, ducks, geese, turkeys, and eggs.

As in all business enterprises the farmer is dependent upon the demand for his product by the public, i.e., the consumer. The farmer has a tremendous responsibility to establish and maintain the quality of the products which he produces for the market. According to the Yearbook of Agriculture, 1966, "In order to protect the consumer from the diseases carried by animals, the United States Department of Agriculture was established in 1862. This department initiated such controls as a meat inspection system, and advises 150 farm magazines with a readership of 22 million. It is through these media that farmers get much of their information on the ever-changing technology that helps protect our food such as the feeding, sanitation, and housing that help keep livestock healthy; the diagnostic tests, vaccines, antibiotics, and drugs that aid in controlling diseases of poultry; the fertilizers and growth regulators that make crops highly productive; the pesticides that prevent serious damage by insects and weeds; and the management practices that help safeguard farm products against deterioration after harvest."

Concept
XVI.

Dairy farms provide America with one of its most important products, milk. Milk's components and their balance lead to its description as the most nearly perfect human food. There are many environmental factors that affect milk. The milk-producing cow is subject to infection by a number of micro-organisms, some of which cause illness in humans. Proper diet is especially important in raising dairy cows. Pastures should consist of proper grasses and be free of weeds that flavor milk, such as onion or garlic. Pasture land should be properly drained of water that could form stagnant ponds and be a source of undesirable bacteria on the cow's coat. Fresh water must be available for the cow to drink. Cows are not sprayed with insecticides since these chemicals can accumulate in fatty tissues and later appear in milk. Pesticides are sprayed on adjacent fields when air currents will not cause drift on to pasture land.

Machines are now used almost exclusively to milk cows. The milk is then piped to a storage tank without exposure to contamination by dust and insects. The machines are cleaned in place without disassembly after every milking. Milk must be stored on the farm until enough is available for economical transportation to the pasteurizing or processing plant. During this period the growth of any contained bacteria must be prevented. Chemicals are not added as preservatives since they may unfavorably alter milk. After milk is taken from the cow it should be cooled quickly to a temperature of about 38° F. This can be done with refrigerated storage tanks that cool milk quickly and maintain it at a low temperature. The tanks are much more effective and sanitary than milk cans.

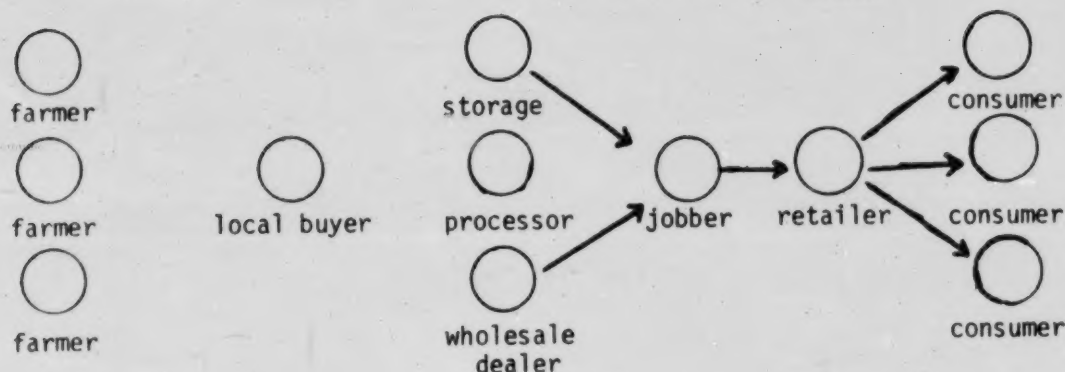
The Public Health Service recommended the Grade "A" Pasteurized Milk Ordinance. This is a guide for milk production, transportation, processing, and delivery. Pasteurization may be accomplished by any one of several legalized heat treatments. They are: 145° F. for 30 minutes, 161° F. for 15 seconds, or any other procedure shown to be as effective as these treatments. Pasteurization's primary purpose is to destroy the majority of disease producing organisms that might be in the milk.

A treatment associated with pasteurization is the homogenization of milk to reduce the size of fat globules. Vitamin D, which humans require, also is added to compensate for a deficiency of this vitamin in milk. After undergoing various processing treatments the milk is packaged and kept refrigerated until delivery to the retail store or directly to the consumer.

In an economy such as ours it is a basic truth that supply and demand actually sets the price of produce. If the demand for lean pork is great, then meat-type hogs will bring higher prices. If consumers should suddenly decide to buy only beef, then the price of cattle would rise and that paid for other meat animals would go down. However, the consumer usually switches back to the lower-priced meat and there is a tendency for all prices to level off. The demand for any product, whether it be grain, fruit, cotton, tobacco, or anything else, will for the most part set the price.

Chicken, eggs, and meat are among the most popular foods in the United States. As a result, American poultry farmers raise about nine times as many chickens as all other poultry combined. Due to a recent demand for "broilers" (chickens 6 to 13 weeks old) by the manufacturers of frozen "TV dinners" and "carry out" chicken outlets, farmers raise five crops of chickens a year.

BEST COPY AVAILABLE



MARKETING CHANNEL FOR POULTRY

The profit of the dairy farmer is dependent not only upon the production of a quality product but upon various other factors as well. Dairy cows must have good pasture land with a proper balance of soil, sun, and water. A period of drought may force the farmer to buy feed for his cows, thereby reducing his profit. Another hazard of farm production is vandalism, which is usually associated with the city environment. Vandalism on the farm cuts into profits and runs the gamut from theft to destruction of crops with mini-bikes. This loss must also be absorbed by the farmer.

Science has come to the aid of the farmer through technological advances in preventive medicine, improved processing methods, and time-saving machinery. Modern technology in the form of chemicals that eliminate or control disease, modern processing methods that protect products from contamination, and milking machines for the dairy farm help increase profits.

Because proper nutrition is so fundamental to the farm industry, researchers have introduced recycling into this area. The May, 1971 issue of the Farm Journal states, "Hog manure is being fed right back to hogs in a nutrient recycling test just started at Michigan State University. Researchers there, headed by H. C. Zindel, already have amassed considerable data on drying and feeding animal and poultry waste."

E. R. Miller found that hog waste contained 26% protein on analysis. It is also high in calcium, phosphorus, and other nutrients. The experimental ration includes 22% hog waste and 78% ground corn. "So far, pigs are eating it well and seem to be doing fine," Miller reports."

Is the city dweller as aware of the opportunities to preserve his environment as the farmer? There are many areas for comparison when talking about the importance of maintaining good health through government regulations. This area of concern does not end when the product reaches the market, but continues with cleanliness as the food is consumed.

Whenever possible comparisons should be made between the factors that influence farm production with similar measures taken in industries found in the city. The importance of continued research and its effects both on the

farm and the city, as well as the future prospects of both areas, should be compared and contrasted throughout the unit.

"There are three main kinds of cattle: those best for the production of beef, those used for dairy farming, and those that serve a dual purpose - milk cows, the calves of which can be sold for beef. Aberdeen-Angus and Herefords, among others, are beef cattle; while Jerseys and Guernseys are two of the best known dairy breeds. Devon, Red Polled, and Milking Shorthorns are all dual-purpose cattle. Then, too, there are different degrees of cattle, ranging from the lowly scrubs through the grades to the beautiful registered thoroughbreds.

Scrubs are nondescript cattle of unknown parentage. Grade cattle have one parent either scrub or grade, and the other from a registered breed. Any herd can be improved, or upgraded, as the proportion of thoroughbred parentage of each animal is increased.

But upgraded cattle can never be registered, for all registered cattle have a long family record, and must have two parents already registered with a cattle breeders' association.

Beef cattle are grown in two ways, either fattened for market on the Western ranges, or shipped from the West to be fattened by Eastern farmers. All full-grown beef cattle are heavy and short-legged, so as to produce as much meat as possible. In breeding dairy cows large milk production has been the goal.

Almost all of our cattle breeds originated in Europe, and thrive best in a cool climate. For most cattle, like all dogs, have no sweat glands. They must cool themselves through their mouths, nostrils, and extended tongues.

But there is one breed of cattle which, like man, does perspire through its body, and so is well adapted to the warm weather found in the South. This is the Brahma, which was originally the humpback "sacred cow" of India. This breed has been successfully crossed with high-grade cattle of European producing new hybrids which do not suffer from excessive heat. These new breeds have largely replaced the oldtime Texas longhorns as beef animals on the Western range."¹

¹Ray Brethers, Perhaps I'll Be a Farmer.

FARM MACHINERY

Concept
XVII.

Most of the farm tools used before engines developed were much like the tools used by farmers of ancient Egypt, China, and Greece thousands of years ago. Farmers used materials such as wood and leather, since these were inexpensive. Because steel was so costly some tools were made from other metals such as iron, copper, and tin. Among the most frequently utilized equipment was the ax, which was wedged to a heavy material fastened to a stick. One edge of the wedge was sharpened to a knife-thin edge. The hoe, which is used for making furrows and chopping out weeds, has not changed

for thousands of years. The first hoes had chopper blades made from pieces of seashells or animal bones. Farmers used pitchforks for scooping up hay and straw thousands of years before people used forks at the dinner table. The first dinner forks were copied from wooden-pronged farm forks. Through the centuries the plow developed from a forked tree branch with sharpened ends. Many types of iron plows were invented between 1750 and 1850. The function of a plow is to dig shallow trenches across fields as the first step in preparing soil for seed planting. Old-fashioned rakes looked like artificial hands with fifteen or twenty fingers. The horse rake, in about 1860, had long curved fingers of iron or steel suspended between two wheels. A driver sat in a bucket seat behind the horse. He raised or lowered the fingers of the rake with a hand lever next to the seat. The scythe, used for cutting hay and ripe grain, was invented by a Puritan blacksmith in Massachusetts around 1650. The flail was an extremely important harvesting tool. It was made of two hardwood sticks held together by a joint. Flailing dislodged seed kernels from stalks and husks. A common type of early wagon used on the farm was the box wagon. It was an oblong box with a wheel at each corner. During the winter the wheels on the wagon were replaced by sturdy iron or wooden runners so it could be used as a sleigh. Until thirty or forty years ago, horses and mules were used for power work. These work animals have been replaced by engines. This change-over from horse power to engine power was part of the Agricultural Revolution. It occurred between 1935 and 1950 on farms in the United States and Canada. Now a family could develop up to five or six times as much land as they had previously. Engines, however, are far more expensive to operate than the horses and mules whose food was grown on the farm. (For instance, dairy farm machinery exceeds \$100,000.) The farm engines in our country are too big and too expensive to be used on small farms. Since a farm is so expensive to operate, more cropland is needed in order to make a profit. The farmer must also know more about science, land conservation and mechanics.

New farm tools that developed with the advent of low-cost steel, electricity, and automobile engines include the following:

- combine - This machine does the job of the scythe, flail, and pitchfork but more rapidly. The combine cuts the ripe grain, threshes out kernels, and bags them. It also bales the straw.
- cultivator - Its curved steel fingers, attached behind the tractor, have replaced the hoe for chopping weeds out of crop fields and hilling up earth along each side of growing plants.
- disc harrow - A modern disc harrow is a row of sharp metal discs, ten to eighteen inches high, suspended in a metal frame five to ten feet long. The function of the disc is to break the furrows of the earth into smaller pieces and level them so that crop seeds can grow more quickly into plants.
- milk parlor - Cows are milked by machine as they ride on slowly revolving platforms. The cows' meal is poured into a basin built into the stanchion, a device placed around animals' necks to keep them from moving too far backward or forward. The milking machine is attached to the cow's udder. At the end of a seven-eighths revolution the stanchion is unlocked and the milking machine is unhooked. Then the cow wanders down the ramp that leads back to the barn.

- pickers - Intricate machines, designed for one kind of crop, can do things such as pick cotton, dig potatoes, scoop blueberries neatly off stems, and gently pick apples or peaches.
- planters - This tractor drawn machine plants seeds at proper intervals and squirts enough fertilizer under each seed to start it sprouting.
- tractor - The workhorse of the modern farm, the tractor pulls all types of machines and can be used in almost any kind of weather.

Concept
XIX.

The success of a productive farm depends to a great extent upon the operating efficiency of its machinery. Preventive measures are taken to insure the long life of the machines and the safety of their operation. Well-prepared farm tractors should contain a first aid kit and a fire extinguisher. Even minor repairs should not be made when the motor is running. Tractors should be stopped and their engines cooled before refueling. Tractors or other machines with internal combustion engines should never be operated in an enclosed area without proper ventilation. Machines all need oil in their moving parts. They need regular painting so they will not rust. Farmers must see to it that their machines are always ready for use. They are careful in using them and watchful for everyone's safety. In operating farm machinery the farmer knows that he must never mount or dismount while machines are in motion. Farmers' children are taught to stay away from farm machinery. Repairs should be made during the slack winter months so that the machines are ready for use when peak efficiency is required.

Concept
XX.

Much of our soil-building depends upon farm machinery. According to ecologists, plowing wipes out the soil arthropods and other important soil organisms. Discing, for example, is said to be much less damaging to soil-building arthropods and insects. On the other hand, high speed plows in fields and orchards energized by controlled vibrations and blades scoured by compressed air will efficiently turn over many furrows at once. Self-propelled planting machines with changeable seed plates will have four different systems for planting a variety of crops. Ecologists feel that farmers may plant a mixture of plants and thus come closer to the natural stand nature produces. Problems of the soil; such as being packed down by the wheels of heavy farm machines, can be avoided by a bridge-type machine that spans the field, each resting on a power unit running on a separate roadbed outside the field. Planting, cultivating, and harvesting machines would travel back and forth in opposite directions along this bridge, which would move automatically at each pass.

THE FARM OF THE FUTURE

Concept
XXI.

Science has helped to develop nearly all modern agricultural processes. For example, scientific discoveries about man's dietary needs have greatly benefited farmers who produce milk, eggs, fruits, and vegetables. Science has shown that these foods contain important vitamins, minerals, proteins, and other nutrients. Farmers have bred hardier livestock and poultry, and have developed new varieties of wheat and corn that produce more bushels of grain per acre. Science has proved that plants need certain elements to grow well. Many improvements in the breeding, feeding, and raising of farm

animals have been produced. While there are not as many farms or farmers as there were ten years ago, farm production is on the increase.

Yet, ecologists believe that American farmers are using farming methods that do more damage than is necessary to areas beyond their farm's boundaries. They deplore the use of persistent pesticides and allowing fertilizers to pollute streams and lakes in greater amounts than can be tolerated indefinitely. Ecologists do not believe that farmers are polluting maliciously, but rather as part of a production system that stresses economics over environment. One production aspect that looks particularly questionable to ecologists is the present policy of using methods that cause environmental damage to produce commodities of which we already have surpluses. Ecologists, while not actively involved in farming, do have ideas for the farmers. Perhaps their ideas may become the farm production methods of tomorrow.

In fruit production, for example, there are several ways farmers could approach insect and disease control. They might not spray at all, in which case more blemished fruit would be marketed and much of the crop would be periodically lost. They could spray only when a major pest infestation has been forecast. Or they could, as they now do, spray on a regular basis that prevents pests whether or not there are any, thus more nearly insuring no blemished fruit at all. Energy and materials cost required and ecological damage incurred by the last-mentioned method is unbelievable.

When the farmers plow they wipe out the soil arthropods and soil organisms known to be important to soil building. Modern herbicides and other chemicals affect soil organisms. Farmers then repeatedly plant one crop, and this does further damage. In the future, farmers may plant a mixture of plants in the same field, coming closer to the natural state of nature. They might do less plowing, or none at all. Discing, another form of plowing, also damages soil building arthropods and insects.

"Ecologists see not only farmers, but the entire citizenry of the United States infested with two diseases - cleanliness syndrome, a compulsion to overwash, overspray, and overkill. The other is the Blemished fruit syndrome, which says that anything short of perfection, even a tiny scab on a big apple, is not acceptable."

We always will, and should have, pesticides, judiciously chosen to keep pests down. But we do not live in a sealed, aseptic world, in which everything is neat and clean. We cannot kill every weed, every insect, that threatens. Nor should we want to.

Environmentalists are also concerned with the population explosion. The world population is predicted to zoom to 6 billion in the next thirty years. Farmers will need today's knowledge to produce enough food to feed the population.

A cow may give 30,000 gallons of milk in the year 2000, compared to 8,000 gallons today. Cornstalks may look like squatty pine trees so that they can absorb more sunlight, with the ears growing out of the top to make harvesting easier. A machine that bounces high-frequency sound waves

¹"Perfect Produce," Missouri Conservationist, April, 1971.

through a steer's flesh will enable cattle raisers to predict the exact shape and weight of every meat cut, and aid them in selecting the best breeding stock. Scientists are on the verge of releasing hormones for the female animals that will enable them to produce twice as many offspring as presently. Milk that tastes like fresh cow's milk will be manufactured from vegetable products such as soybean. Already some of the large dairies are marketing cream substitutes containing no dairy products.

Twenty-first century farmhouses will have control centers with as many dials and levers as a jet plane's cockpit, from which electronic machines on the farm will be inspected and controlled. A battery of closed-circuit television receivers will permit farmers to see and hear everything that is going on in the barns and other outbuildings at any time of the day or night. They may watch a calf being born or be warned of a cow with colic, all without leaving their houses.

Multi-story skyscrapers will house the farm animals and poultry in completely controlled temperature and humidity. Flanking these buildings, feed mills will automatically mix the type of feed each group of livestock requires and release it in proper quantities into feeding troughs at preset times. All waste from the barns will flush through pipes to the nearby fertilizer treatment plants, where it will be treated and dumped into automatic manure spreaders, while the water which is drained off will be purified and reused.

Huge transparent domes will exist covering as much as ten acres, in which special crops will be grown under computer-controlled conditions of temperature, humidity, irrigation, and fertilization. Since twenty-first century farms will rely so extensively on machines, they will have garages and machine shops, which might be large plastic bubbles to allow room to store the huge, expensive plows, reapers, mowers, harvesters, and tractors. Several well-trained automobile mechanics and electronics men will maintain them.

Much of the food for the billions of new people in the next century probably will have to be produced from sources other than farmers' fields and orchards. A promising method of raising food is hydroponics, the growing of plants in water with fertilizers. The harvesting of various seaweeds and plants for food, which has been carried on for many years, especially in Japan, and the scientific farming of fish, will increase the food supply. Huge refineries will produce rich proteins from plankton.

The farmer has come a long, long way since the pioneer days, far beyond the most imaginative colonist's wildest dreams. How far beyond the vision of the most forward-thinking American farmer of today will the farm of the next century be? How will the farm of the future best benefit from ecological information that is being gathered today?

Careers

Forest ranger - one who patrols forests, watches for fires, and manages state and federal parks.

Conservationist - One who is concerned with the preservation of natural resources.

Surveyor - one who measures land by angles and distances to determine boundaries, area, or elevations.

Soils technician - one who studies the composition of soil and suggests to the farmer ways in which he can improve the soil.

Nurseryman - one who owns or works in a nursery growing plants.

Butcher - one who slaughters and dresses animals for food; one who prepares, cuts, and sells meat.

Veterinarian - one trained and authorized to treat animals medically.

Mechanic - one skilled in making, using, or repairing machines and tools.

Truck driver - one who drives a heavy automotive vehicle designed for transporting loads of livestock or products produced on the farm.

Crop duster - one who flies above the farmers' crops and sprays chemicals that will kill weeds or insects.

Insurance salesman - one who sells the farmer insurance for his possessions.

Dietician - one who studies human diets and nutrition.

Milkman - one who delivers milk from the farm to the plant for processing.

Farmhand - a hired farm laborer who helps the farmer.

Livestock raiser - one who raises cattle, horses, or sheep for his own use or for sale and profit.

Heavy equipment operator - one who operates a bulldozer or other heavy equipment for making artificial ponds and lakes.

INSTRUCTIONAL SEQUENCE

Administer pre-post test prior to introducing unit. Evaluate. It is assumed that the students' preassessment indicates that they will have a little knowledge of the farm and its functions.

ROOM PREPARATION

In order to stimulate interest in the unit, a bulletin board depicting a farm scene is displayed. If available at the time, display the model dairy farm that is available on a loan basis from the National Dairy Council. The buildings, animals, equipment, and people are miniature wood carvings and can be set up to show what an ideal dairy farm contains. It is suggested that one corner of the room be used as a reference area. In this area, there can be books pertaining to the farm, student and/or reference; products of the farm, i.e., an ear of corn, various seeds, cotton, gourds, or fruit; different samples of soil and rocks; pictures of farm animals and machinery. Arrangements can be made with the librarian to set aside a separate reference shelf in the resource center and have film strips available to be used either in the library or in the room. Appropriate films should be ordered to be shown during the unit. Arrangements should be made for field trips. These can include a visit to a farm or a walk around the school site. Invite children's parents or grandparents who may have lived on farms to relate their childhood experiences. Use other resource people who are available to visit the classroom.

ACTIVITIES WILL BE RELATED TO THE VARIOUS TOPICS INCLUDED SUCH AS:

- A. Introduction to the farm
- B. Soil
- C. Plant life
- D. Livestock
- E. Machinery
- F. Farm of the future
- G. Careers

TOPIC A: Introduction to the Farm

1. Read the book, The Real Book About Farms, to the children. Discuss what was read and write an experience chart with the students. This chart should include vocabulary pertaining to the farm and should be placed on the bulletin board in the special interest area. The children can then continually add to the chart. Data sheet on page 136 could be used, too.
2. Have the children write about what is personally expected of them as a member of their family and as a class member. (Emphasize responsibilities, attitudes, behavior, decision making.) Students can then list farm family role expectations for the following people: a girl, age 8; a boy, age 12; a mother, a father, and perhaps other relatives living at home, such as older siblings or grandparents. (Again stress responsibilities, attitudes, behavior, decision making, and sharing. This shows the comparison of the city versus the farm.)
3. As the cities become larger and take over more of the farm land, compare the pollution that is generated by the city with the pollution that is put out by the farm. (Traffic-tractors; junk yards-junk pile; purified water-well water; smog-country air; garbage-fertilizers; factory wastes-phosphates; city machinery-farm machinery; plants-crops; city animals-farm animals.)
4. After discussing the pollution problem in the city and on the farm, let the children draw posters concerning pollution. They can use pictures they find in magazines, use tempera paint for background, or combine both in the form of a collage, making up their own slogans. (i.e., Pollution - Who Needs It?).
5. After the discussion of life in the city versus life in the country, the teacher can teach songs from I Like the City and I Like the Country, Silver Burdett Company, 1956. It is suggested that the teacher introduce songs about the city first, and then, during later lessons, bring in songs about the country. This will be an excellent opportunity to dramatize the songs. See data sheet, page 118.
6. While talking about country music, the physical education teacher could introduce the children to square dancing. (RCA Victor, First Folk Dance, EPA 4144.)
7. After discussing the different types of crops and animals found on the farm, the students can construct a written list of as many crops and animals as they can find within the word, SUPERCALIFRAGILISTICEXPIALIDOCIOUS. Use any data sheets on pages 89-109 for K-1.
8. After viewing a film on farm animals, the children should discuss the types of animals, their care and use.
9. After viewing transparencies of farm animals, zoo animals, and animal pets from Plants and Animals, Milliken Publishing Co., and discussing their habitat, food, and appearance, the children can write a riddle, giving one clue about the animal's appearance, habitat, and what he eats. The other students have to guess what the animal is and specify whether it would mostly be found on a farm, in a zoo, or as a household pet. One could use data sheets on pages 111 and 112 at this time.

10. After discussing the different categories of animals, farm, zoo, and pets, the children could pretend that they are various animals and imitate their sounds. A fun crossword puzzle could be done now, see pages 120, 121, and 122.
11. The song "Old McDonald Had a Farm" will give the children much enjoyment when making animal sounds.
12. After discussing different farm animals, the teacher is to pretend that she is the farmer and give each child the name of some animal. When each student has a name the farmer tells or reads a story about what happened to all the animals one fine summer day. The farmer is careful to bring in the name of every animal so that every player will have to get up and pretend to be the animal. For instance, the one who is a donkey will have to kick up his heels and say, "hee haw!"
13. After discussing the types of farms and their specialties of either crops or animals, the children will discuss why specific crops are grown in certain parts of the country and why animals are raised in certain parts of the country, keeping in mind climate, soil, elevation, and animal feeding habits. See data sheet on pages 123 and 131.
14. After discussing the chief kinds of livestock found in our country, the students will use a bingo game to identify the types of animals.
15. In teaching measurement, the teacher could talk about these terms which are used on the farm. The teacher can test mastery of these terms by using number sentences.

peck - 8 quarts or 1/4 bushel
 bushel - a dry measure of 4 pecks
 of 32 quarts
 1/2 gallon - 4 pints or 2 quarts
 pound - 16 ounces
 ton - 2,240 pounds
 1/2 acre - 2,420 square yards
 pint - 1/2 quart

quart - 2 pints
 gallon - 8 pints or 4 quarts
 1/2 pound - 8 ounces
 acre - 4,840 square yards or
 43,560 square feet
 (includes all four sides)
 yard - 36 inches

16. Children often wonder how far away things are. There is an easy way to measure distance using the pace method. Measure off a 100-foot line with a tape measure. Mark each end of the line by having two students stand at each end. Have a student start at one end of the line. Keep count of how many times his left foot touches the ground as he walks to the end of the line. Divide 100' by the number of times his left foot touched ground. This equals the pace in feet for that child. (A pace begins on the left foot, followed by the right foot, then followed by the left foot. Use normal step.)
17. It is important for students to be aware of the size of the given areas in relation to their school site or home lawn. To give students a kinesthetic approach to measurement, have them pace off an acre on the school grounds. Have four students place themselves so as to form a square 209 feet on each side. To determine how many paces will equal 209', divide the size of each student's pace into 209'.

18. After viewing the film, "Nature's Half Acre", which shows the life cycle of plants and animals through the four seasons, students can discuss how much activity or growth there is on an acre. It would be interesting to keep an acre marked off throughout the year at the school site to observe the growth on that plot throughout the seasons. See Data Sheet on page 130.
19. After talking about how a farm is run, discuss the wages of a farm hand. On a dairy farm he works a 12-hour day, seven days a week, 365 days a year. What would the farmer have to pay a farm hand annually if he were paid \$2 per hour? Other problems can be projected. (Adding the cost and upkeep of farm machinery, cost of supplies and seeds, cost of feed, profits the farmer can realize, etc.)

TOPIC B: Soil

Lesson I. Introduction to Soil

Materials: rich variety of pictures to illustrate the following concepts: hills, lakes, rivers, oceans, fields, etc.; supply of soil in a transparent container; supply of shovels; and empty containers.

1. Teachers show pictures listed above to illustrate the fact that soil is all around us as a cover of the earth. When showing the pictures of the lakes, oceans, etc. be sure to stress fact that soil covers the bottoms of these bodies of water. Teacher will introduce the word soil as the correct word for this loose surface of earth. Up to this point children have probably only known it as dirt.
2. Discuss with children, the color and texture of soil (they may think of it as the grassy substance covering hills, etc.) Have the children locate a sample of soil placed conspicuously in the room. Have children touch and smell it. Question children as to where they think the soil came from. Is there any place we could find some soil in our school site?
3. Have the children take a walk on the school site. With shovels have them dig a few soil samples from different sections of the school site. Place these samples somewhere in the room where the children can observe them throughout the day.
4. Let the children hear the song, "Mud", in the Silver Burdett Series (Book for Grade I). After the children become familiar with the words and music, perhaps the teacher would enjoy having them draw pictures of things that stimulated them in the song. Also see poem, Mud, included in students' data sheets, page 119.

Lesson II. Importance of Soil

Materials: small green plant growing in soil. Pictures of trees, flowers, food (such as potatoes, corn, etc.), large illustration on board or picture showing the root of a plant held in place by soil. (Review previous day's concept of soil and discuss the importance of soil.)

For review, suggested teacher questions:

- a. "What is the correct word for the material that is on our containers?"
- b. "Where can you find soil?"
- c. "What does it feel like?"
- d. "What is soil?"

If the children demonstrate adequate understanding of the above concepts the teacher may proceed to show the importance of soil.

1. The teacher will show children a small green plant held in soil. Have the children observe it closely. Have children formulate why the plant is in the soil.
2. Ask children if they can think of anything other than something like this small green plant that grows in soil. As they mention trees, flowers, food plants, seeds, grain, etc., have them draw their contributions on the chalkboard.
3. Discuss how much of our food grows in soil. Question the children about what would happen if we did not have soil. Also question them as to what kinds of food our farm animals eat. Where does their grain and seed come from?
4. Have children, either at home or school, look through magazines to find at least three pictures of plant life in soil. Have the class make these into some kind of resource book showing the different things that need soil.

Lesson III. Formation of Soil

Materials: collection of different sizes and colors of rocks (perhaps children would like to bring these from outside of school); large colored pictures of rock formations, such as the Grand Canyon, Niagara Falls, etc; film, "Rocks for Beginners," available from County Audio Visual, microscope or magnifying glass, soil samples.

1. Have the children place soil substances under a microscope or magnifying glass. Perhaps with younger children it will be necessary to explain the function of these instruments. Have children observe the samples and talk about their observations. It is hoped that children will detect particles of rocks.
2. Show children a picture of a cake. Question them as to what ingredients have gone into the cake. The ingredients together help to form the cake. Soil has ingredients, too. All soil contains rock particles. Have children brainstorm how the rocks got into the soil.

3. Give children time to feel and observe the collection of rocks. Call their attention to textures to develop words such as rough, smooth, sharp edges, ridges, jagged, pointed, damp, cool, slimy. Discuss how rocks feel when you walk on them in your bare feet in the hot summer sun. Talk about shapes and weight of rocks. Encourage the children to use as many of their senses as possible while observing and describing these rocks.
4. Show the film, "Rocks for Beginners" (available from County Audio Visual). Preview film before showing it to the class. Have children discuss any new ideas that this film offered them.
5. See poem, The Friendly Rock, on students' data sheet on page 119.
6. Have the children bring stones from home, paint or decorate them, or make them into faces or small mosaics.

Lesson IV. Rocks Can Be Broken Down in Several Ways

Review the previous lesson. If children have adequate knowledge that soil has ingredients, one of the main ingredients being rock, that rocks come in different sizes, shapes, colors, weights, and hold various temperatures, the teacher may proceed with the following instruction.

Materials: pictures of Grand Canyon, etc. as mentioned in previous day's lesson, samples of rocks, preferably of different sizes.

1. The teacher will display attractive colored pictures of rock formations. Perhaps the children will be able to recognize the Grand Canyon, or if the teacher identifies it some of the children may be able to relate vacation experiences there. Discuss the vastness of the Canyon, the largeness of the rocks, their weight and color.
2. Show children smaller rocks from the display. Ask them if rocks have always been this small? Could there be a possibility that at one time small rocks were part of larger rocks? Where could they have come from? How did they get to be so small?
3. Have children experiment with small rocks, to try to break them down into smaller pieces. It is hoped that the children will realize that this can be quite difficult to do. Have children brainstorm as to how rocks can be broken down into small particles. Stress the idea that nature can do this, but by a very slow process called weathering. Teacher questions might include: "What could water or rain do to rocks?" "Did you ever see a plant or tree growing in a rock?" "What would this do to the rock?" "Could temperature changes affect rocks?" "What effect could moving ice, wind, and waves have on rocks?"
4. As a creative reinforcement have children tell or write a story about a small rock found on the way to school, hypothesizing what and where it might have been once upon a time.

5. Discuss uses of rocks with children, such as stone for houses, paths, and rock gardens. Chickens diet consists of gravel rock which helps them form the shell of their eggs. Have children compose a chart depicting uses of rocks.

Lesson V. Soil Formation

Materials: film, "Wonders in Your Own Backyard" (available through County Audio Visual), samples of soil, magnifying glass or microscope, pictures of animals that live in the soil.

1. Place a large piece of white paper on the floor. Have children empty a large sample of soil on it. Spread the soil out on the paper. Have children observe signs of life in the soil. Discuss with children the different animals that live in soil.
2. Show the class the film, "Wonders in Your Own Backyard." Preview this film before showing it to the group.
3. After viewing the film have children relate any new information they learned. Explain the function of organic matter in the soil. The example of the earthworm may help here.
4. Encourage children to bring soil animals found in soil samples from their own backyards. Exhibit them in the room in baby food jars with air holes. The soil animals might include worms, ants, beetles, sow bugs (roly-poly), etc.
5. Make enlarged pictures of these soil animals and have children paint or color them, cut them out, mount them on large-size poster paper, and draw creative backgrounds for their animals.
6. Teach songs, "The Porcupine" and "The Groundhog" from Making Music Your Own Way, Teachers' Edition, Silver Burdett Co., Book 2.

Lesson VI. Soil Differences

Materials: two pint or quart jars, sand, clay soil, water, glue, sand, modeling clay.

1. Have the children feel the sand and the clay soil. Explain that soils differ. One way that they differ is in the size of rock particles in them. Remind children that sand consists of loose particles of broken rock. When certain kinds of rocks are reduced through the centuries into small particles, the result is clay.
2. In order for the children to understand that soil is different and not all soil fosters plant life, the teacher will initiate the following activity:
 - a. Have a child fill one jar half full of sand.
 - b. Have another child fill the second jar half full of clay.

- c. Place jars in a prominent place in the room.
- d. Pour equal amounts of water into each container.
- e. Have children observe the immediate results.
- f. It would be good to let the jars stand for a week and observe them again.

The results will show that sandy soil absorbs water faster than clay. Clay soil absorbs more water and holds it longer.

3. Have the children speculate what will happen to these soils after a week's time.
4. Discuss the different uses of sand and clay.
5. Have children make creative glue designs. When the glue is still wet, have them pour sand over glue. The sand will give texture to the design. Have children create soil animals (discussed in previous lesson) through media of clay modeling.

Lesson VII. Soil Varies According to Climate

Materials: suggested pictures such as cactus plants, rice field, wheat field, New England forest, apple orchards in Oregon, Florida citrus fruits, cotton, plantation, etc.; film, "Johnny Appleseed" (available through County Audio-Visual), enlarged outline map of the U.S.

1. The teacher will explain the meaning of climate. See how many words the children can use to describe climate. Have children express their ideas about St. Louis' climate. Ask them if they have ever visited a farm around the St. Louis area. Discuss what types of crops they saw growing on those farms. Explain what the term "Midwest" means. Can the children guess or show where St. Louis or Missouri would be on the enlarged, outlined map?
2. With a magic marker the teacher will section off another section of the U.S., perhaps the New England area. From a choice of the suggested pictures, above, ask the children what types of plant life you might find in this section of our country. It might be good to discuss the first settlers in Jamestown. What type of country had they come to make a home?
3. The teacher will proceed by continuing to section off different climatic regions: our desert area, the deep South, the coast of Florida, etc. Question children about what types of plant life would be found in these sections.
4. Now, on the sectioned map, have the children draw in different plants or crops in the appropriate areas.

5. Give child an outline map of the United States. Have the children section off their own maps in a way similar to that of the large map. They may want to illustrate their section crops or bring magazine pictures from home to paste on the map. See data sheet on page 123. Younger children may enjoy bringing pictures from home, such as grape-fruit, etc., to make a collage of climatic products.
6. In order to review the concepts of soil differences according to climate have the children name orally one type of plant, its type of soil, and the climate that is most conducive to its growth.

Lesson VIII. Fertilizers, Sunlight and Water all Have an Effect upon Plant Life in the Soil

Materials: one wooden box 3 ft. by 4 ft. and a similar sized-plot on the school site (If this is impossible another box may be used.), bags brought by pupils containing sand, dead oak leaves, gypsum, garbage, and steer manure or other organic material, trowel, water sprinkler

1. After discussing and explaining words such as fertilizer, etc., the teacher will ask the children what would happen if plants in soil did not have water, or were not exposed to the sun, or were placed in soil that had not been fertilized. Perhaps the children may help to create a chart story about their anticipations for such plants.
2. In order to check their hypotheses, the class may participate in the following project:

One-half of the class will plant rows of bean seeds in a plot of soil on the school site. The children will begin by loosening the soil with a trowel. Have them add materials such as gypsum, manure, etc. Moisten the mixture and stir again. Plant bean seeds.

The other half of the class will place soil in a wooden box or container in the classroom. They will not add fertilizer or moisten their soil. They will place the box in a spot in the room not too accessible to sunlight. Add bean seeds to the soil.

3. Have children observe the plants daily. Chart their progress, and after two weeks have the children state orally or in writing why some plants grew better than others.

Have children make their charts using color legends. For instance, red could represent one-half inch of growth, blue could represent one inch, etc. This activity will lend itself to measurement terms, use of the ruler, etc.

Lesson IX. Erosion

Materials: film, "Erosion" (available from County Audio-Visual) or film, "The Golden Secret" (available through Missouri Conservation Department).

1. Read or discuss the significance of the settlement at Jamestown. The children may need to be aware of the type of land that was used for settling. How did the settlers adjust to their land? How did they survive? Where did they secure food? What did they have to do before they could even begin to grow their own food?
2. Discuss the word erosion. Have the children ever noticed eroded land around their school, neighborhood, etc.?
3. Show one film on erosion. Discuss with the children the different concepts they learned from this film.
4. Discuss the problems and seriousness of erosion, the effect it has upon plant life, especially farming. Have the children brainstorm how soil erosion could be prevented.
5. Take the class on a walk around the school site. See if they can point out land that is eroded to some extent. Have the class explain why there is little or no plant life on that ground.

TOPIC C: Plants

1. Take a field trip around the school playground. Look at and talk about various plants. Bring a few complete plants back to the classroom. Place the plants in glasses of water. Encourage the children to identify the plant parts: roots, stem, leaves, and flower (if the plant has reached the flowering stage). Use data sheets on pages 124, 125 and 126.
2. Ask the children to bring in various fresh vegetables. Some should bring in leaves, such as lettuce, cabbage, or spinach; some stems such as celery or rhubarb; others seeds, such as peas, beans, or peanuts; and still others roots, such as radishes, potatoes, turnips, carrots, and beets. Some should bring in seeds in a pod such as green beans and peas. Some should bring in flowers that we eat such as cauliflower or broccoli. Allow children to group these vegetables by the parts that we eat such as leaves, stems, seeds, roots, and flowers. Reference to data sheet on page 128 might be done at this time.
3. Plant a vegetable garden. Plant seeds in milk cartons and place cartons on the windowsill. Each carton should have a drainage hole punched in the bottom. Place milk cartons in discarded TV dinner trays. Follow directions on the seed packages for planting and caring for the plants. Discuss data sheet on page 127.
4. Collect several intact dandelion seed heads. Pull out the "parachutes" and allow children to examine them through a magnifying glass to discover why the seeds float so easily through the air. Count aloud as you remove the seeds. Introduce data sheet on page 129.
5. Give each child a peanut. Look for the "baby" plant inside each peanut. Look for the part of the peanut that is the food for the new plants.
6. Soak dried lima beans overnight. Allow the children to split them open. Locate the beginning of a new plant, food for the plant, and seed coat. A magnifying glass may be used to examine the "baby" plant and its first source of food.

7. Collect different kinds of beans: dried pinto, dried navy, dried lima, kidney, and green beans. Display the beans and develop the idea that each kind of bean grows on its own kind of plant. Develop this idea by planting a pinto bean and a large lima bean and listing the differences between them.
8. Construct a chart showing labels of canned bean wrappers from frozen bean packages, and plastic bags from dried beans. This chart will show that we use beans for food and that beans can be preserved by canning, freezing, or drying.
9. Plant some bean seeds in a glass jar. Place the seed close to the edge of the glass so that the children can observe the roots beginning their growth. See data sheet on page 130.
10. Put the roots of an onion or a flower bulb in a pot of rocks. Add water so that the roots are wet. Put the bulb in a dark place. When sprout begins to grow, place plant in loose soil and watch it grow.
11. Geranium or pussy willows are able to begin new plants from pieces of a plant stem. When a section of the stem of a geranium or pussy willow is placed in water, it begins to grow new roots. Place the new plants in loose soil and watch them grow.
12. Plants can grow from leaves. A leaf from the rex begonia can be the beginning of a new plant. Make slits in the edge of the leaf at junctions of large veins. Place the leaf, top surface down, on some damp sand. Cover the leaf with an inverted glass jar. New roots will begin to grow out from the slits.
13. Make a terrarium. Place a few plants, such as various grasses or other plants from the back yard, in the terrarium. After the plants are growing put some insects such as ladybugs, grasshoppers, sow bugs, and caterpillars in the terrarium. Observe the effect of the insects on the plants.
14. After showing the films "In Your Own Back Yard" and "Pests or Plenty," the teacher will discuss with the children the good and bad effects of insecticides. (The teacher should preview the film "Pests or Plenty").
15. After showing the films "I'm No Fool with Fire" and "Woodland Manners," the teacher will discuss with the children the bad effects of fire on trees. (The teacher should preview the film "Woodland Manners.")
16. After observing the experiment related to the effect of fertilizer, sunlight, and water upon plant life in soil, each day all of the children will chart the growth and progress of their plants.
17. After showing the films "Autumn on the Farm," "Winter on the Farm," "Spring on the Farm," "Summer on the Farm," "Beaver Valley," and "Origins of Weather" (4-6), the teacher will discuss with the children the effects of weather on plants. (Teacher should preview the film "Origins of Weather").

18. After the discussion of insecticides, food chains and food webs, the teacher will use children to demonstrate a food chain and a food web. Each child will pretend to be a plant or an animal that the teacher names, and a group of children will construct a food chain. Also, each child will construct a food web. The teacher will explain how insecticides travel from plants to man. The teacher will discuss with the children the form of a food web and how it is possible for insecticides to pass from plants to many animals.
19. The teacher can place pictures of ears for hearing, eyes for seeing, noses for smelling, hands for feeling, and mouths for tasting on the board. Now pictures of plants and plant products can be placed under these pictures. For example, peaches can be seen, smelled, felt, and tasted. Therefore, a picture of a peach will be placed under eyes, nose, hands, and mouth. These pictures can be brought from home or cut from magazines at school.

MURAL

A small group of children can make the farm background on a large roll of paper. After the background is finished, several children can draw or paint the farm buildings. Each child can add a farm animal to the farm picture. Data sheets on pages 111-116 would help the young child before beginning this project.

SEASONS

Cut out the trunk of a tree from dark construction paper. Paste to a background. Paint a few branches on the picture and, using cut sponges that have been pressed into tempera paint, stamp onto paper. During the fall the tempera paint should be fall colors: brown, dark orange, dark yellow, dark red. During the winter the tempera paint should be white to give the effect of snow. In the spring the tempera paint should be light green and light yellow.

VEGETABLE PRINTING

Cut potatoes, carrots, turnips, parsnips, and beets into desired shapes. Apply paint and press them onto paper. Use tempera or finger paint that is not too thin. Also designs in nature from cut fruits and vegetables such as, lemons, oranges, onions, and pineapples (the inside and the outside) make beautiful prints.

NATURE PRINTS

Arrange a composition of leaves (turn veins up) or seeds and seed pods, or sprays of rye, oats, wheat, corn tassels, barley, rice and cedar. Lay paper over it. Roll inked brayer evenly across the paper. Also, one can arrange sprays of rye, oats, wheat, corn tassels, barley, rice or cedar on a piece of dark background paper and spray gold paint over the plants and along the edges of the plant to get a silhouette.

RUBBINGS

Arrange various kinds of leaves on a piece of paper and cover with another piece of paper. Rub lightly over objects with flat side of crayon.

The crayon will pick up only the shapes in the design. Also, the class can take paper and crayon outside and make bark rubbings from the bark of trees.

NEW LIFE FOR DRIED LEAVES

Dry a collection of "natural beauty" between the pages of magazines or newspapers, pressed with a heavy book. After two weeks the leaves are flat, dry, and ready for use. Place dried leaves in an arrangement on light or dark construction paper. For textural variety and beautiful colors, thin slices of orange, lemon, onion, and green pepper can be added. Because of the moisture, these may require several changes of paper and care to prevent mold until they are completely dry. Some materials keep their colors while others turn various shades of brown. Color schemes and designs should be determined before glue is applied.

SEED MOSAICS

Designing with familiar seeds provides children with a real challenge. The variations in color, form, texture, and size of common kernels is almost unbelievable. Usable seeds include wheat, corn, rice, barley, oat, sunflower, watermelon, orange, lemon, grape, apple, pumpkin, squash, and cantaloupe. All kinds of dried peas and beans can also be added. White plastic glue, such as Elmer's Glue-all, is best. Duco cement is also good and it is possible to work with slightly-thinned school paste or rubber cement. Before children have any thought of finished designs, they should experiment by arranging seeds in patterns and shapes. Let them see what happens when the seeds are grouped in a single line, a series of rows, and groups of small clusters. What effect is obtained by simply scattering the seeds on the background?

Mosaic - Give mosaics a 3-D look by gluing seeds on paper plates and shallow boxes instead of on flat pieces of cardboard.

Still life - Use seeds with other art materials to add texture, interest, and design as they do in a cut-paper arrangement of fruit.

Basic shape - Make bold, simple outlines with seeds on squares of colored paper. These outline may be of farm animals.

SCIENCE TABLE ART

Add fun to the art period by raiding the science table. Good collage items are maple wings, leaves, twigs, bits of weeds, acorns, chestnut burs, pine cones, pieces of fern, milkweed silk, and pods. They can be glued to cardboard in the same manner as seeds, and seem to suggest their own subjects.

The fashioning of burdock baskets and hollyhock dolls was a favorite pastime of pioneer children. Your youngsters will have just as good a time when you introduce burdock sculpture. The only materials required are burdocks and lots of imagination! For example: maple wings make fine turkey tails, the petal-shaped projections of pine cones make lovely flower petals, especially when sprayed with paint or painted with tempera.

ANIMALS

Farm animals can be shaped using clay. Animal shapes can also be outlined with yarn. They can then be filled with yarn or other materials. The teacher should talk about the features of the animal before children are asked to begin their design.

TOPIC D: Livestock

Lesson I. Introduction to the Farm and the Group of Animals Called Livestock

1. Discuss the farm and its functions with emphasis on the raising of livestock for the market as one of the main reasons for its existence.
2. Place on the bulletin board or tape to the chalkboard large pictures of farm animals and their young. (See Bibliography for picture source.) Divide the class into groups of six children each. Each group will choose one farm animal. During the following lesson, the groups will report on the origin, habitat, and functions of the animal they have selected. The topic should include several breeds of cattle, horses, pigs, and chickens. This is a good opportunity to introduce children to the library card catalog, encyclopedias, and other available reference materials. Use any data sheet on pages 98-109 for K-1.
3. Show the film "Farm Babies and Their Mothers" (available from the St. Louis County Library). Answer questions about the importance of their care and feeding. Use data sheet on page 113.
4. Sing the song "Old MacDonald Had a Farm" with the children, including only farm animals and the sounds they make. Do data sheet on page 117.
5. Suggested field trips: Purina Farms, a farm machinery company, a feed and grain supply store. Data sheets on pages 133, 134 and 135 are a good review at this time.

Lesson II. Proper Care of Farm Animals Is Necessary Because They Provide Our Meat, Milk, Eggs, and Related Products

1. The groups will have a representative report on the animals they chose to study during the previous lesson.
2. Discuss farm animals in their role as "livestock" and contrast them with the children's household pets.
3. Show the film "Life on a Cattle Ranch" which shows a young boy's experience in raising cattle for the rodeo.

Discussion questions:

- a. "Why aren't the cows, cattle, and chickens given names?"
- b. "Do farm animals get sick?"
- c. "What can make farm animals sick?"

- d. "Does the farmer call a doctor when the animals get sick?"
- e. What do we call a doctor who treats animals instead of people?"
- 4. Prepare a ditto sheet of cow caricature and the accompanying poem, "Listen, Listen" on page 11 of Sounds of Laughter by Bill Martin, Jr. These activities provide a good way to conclude a lesson on a humorous note. At the lower grade levels children can color the cow. At the higher levels the children may create a humorous poem. See data sheets on pages 110 and 117.
- 5. Read to the children "The Funny Old Man and the Funny Old Woman," by Martha Barber, showing them the humorous pictures of the doctor looking down the cow's throat. This could lead to a discussion of the word veterinarian for the lower grades. This poem is found on page 12 of Sounds of Laughter by Bill Martin, Jr.
- 6. Show pictures of various types of land. Have children decide which would be the best farm area for cattle. See data sheet on page 131.
- 7. Construct a diversified farm on a table top. After taping plain white paper to the table, the children will be divided into groups to lay out the fields, livestock, machinery, farm house, barn, silo, and fences. The group responsible for laying out the general outline of the farm will include ponds, fields, and general terrain. The remaining groups will be given clay for animals and machinery, milk cartons for the house, barn, and silo, and popsicle sticks for the fence. Tempera will be used to paint the general farm outline as well as the house, barn, silo, and fences.

Lesson III. The Department of Agriculture Protects Our Good Health

- 1. Discuss the role of the United States Department of Agriculture as it pertains to the care of livestock and to a dairy farm in particular.

Emphasize: Environmental influences such as pesticides, polluted water, and diseases carried by insects.
- 2. Hand out ditto sheet showing beef and dairy cattle with attached detailed background information for grades 2 and 3. Also include a picture of a cow attached to a milking machine. See data sheets on pages
- 3. Show the films "Uncle Jim's Dairy Farm" (available from St. Louis County Library) or "What is Milk?" (available from County Audio-Visual). Discuss new ideas about the dairy farm and answer questions which arose during the film.
- 4. Discuss the ecological aspects of the dairy farm. Bring to class various sizes of waxed milk cartons, plastic milk cartons, and gallon glass containers. Have the children decide which is best on the basis of disposal, possible contamination, cost of production, advertising appeal, storage, and ability to maintain freshness.
- 5. Suggested field trips: Dairy farm, dairy processing plant.

Lesson IV. The Value of Milk from the Standpoint of Nutrition; How Industry Takes Precautions to Prevent Contamination

1. Using pictures show the step-by-step development of a bottle of milk.
 - a. Milk is taken from cow by milking machines.
 - b. Milk is stored in tanks where it is cooled to 38°F.
 - c. Milk is collected from dairy farmers every other day.
 - d. Dairy trucks that collect milk are built specifically to protect the milk from contamination. The interiors of the tanks are highly polished and welded seams or edges are specially smoothed where bacteria might collect.
 - e. Milk is pasteurized. (Explain the process and purpose of pasteurization.)
 - f. Milk is homogenized. (Vitamin D added.)
 - g. Milk is placed in containers.
 - h. Milk is delivered to the retail store.
 - i. The consumer buys the milk.
 - j. People drink the milk.
2. Make milk in the classroom from powdered milk. Discuss skim milk, 2% homogenized, and other milk products in addition to commercial products which are non-dairy products.
3. Make butter in the classroom. Bring a stick of butter in a wrapper which is marked according to teaspoons, tablespoons, and 1/4 and 1/2 cups. Liquid measurement can be taught as part of this lesson.

Note: Provide measuring cups and various milk cartons in addition to teaspoons and tablespoons for activities 2 and 3 so that measurement teaching can be correlated.
4. Using paper plates have the children make collages from magazines of food pictures in which milk is the source, such as cheese, butter, and cottage cheese.
5. Show the film "Something You Didn't Eat," an animated film on nutrition. Discuss the importance of nutrition. This can be correlated with a health unit on care of teeth and bones, and on general well-being.
6. Write on the board the poem "I Never Saw a Purple Cow," or hand out a ditto sheet to include in a poetry folder. Children can color a picture of a purple cow adding a hat or flowers, or cut out a cow from construction paper, glue it on contrasting background, and decorate. This would be a good introduction to a talk about differentiating between real and imaginary animals.

7. Use this lesson on dairy farms in conjunction with Lippincott's Basic Reading, Book F. Use the story "Johnny Blair's Long Night," to reinforce the process of getting milk from farm to store. Johnny's father is a milkman who takes Johnny through the dairy.
8. On a ditto sheet show a scrambled series of pictures depicting the story of milk. The children are to place the pictures in sequential order by numbering the boxes showing each picture. See data sheet on page 132.

Lesson V. Economics, Part I, Why Does the Farmer Farm?

1. Discuss various kinds of farms from the standpoint of why the farmer chooses to raise a particular animal.
2. On the chalkboard draw three small scales, or make three colorful construction paper scales, to illustrate the meaning of supply and demand. Have individual ditto sheets for the children showing scales without hands. The children can color in the proper hand positions following the examples given by the teacher. See data sheet on page 152.
3. Hand out ditto sheets showing two types of pigs (lard type and bacon type). Discuss which type the children think the farmer would be more likely to raise. Why? When the discussion is finished children in grades K-1 may color the pigs and draw in a background. See data sheet on page 151.
4. Ask the students which of the pigs (lard or bacon type) would be more in demand and which would bring a better market price. Have the children show on their individual scales whether the price of ham or bacon would be higher or lower than lard.

Next discuss how changing public demands, such as for poly-unsaturated oils and corn oil, changes the price of livestock and ultimately influences what the farmer raises.

5. Discuss at this point how recycling of waste has been experimentally used, as stated in the background information.
6. Make a bulletin board containing farm animals, cuts of meat, and dairy products. Have children each match animal with the products of which it is the source. The animals are on the left side of the page, the products are on the right side of the page. A different colored piece of crayon or yarn is used for each animal, and joined from the animal to the product. At the lower levels this could be used to teach colors.

Lesson VI. Economics, Part II, Why Does the Farmer Farm?

Stress: Discuss why a farmer would want to raise chickens. Discuss how the chicken farmer's needs would differ from the cattle rancher or dairy farmer from the standpoint of needs such as equipment, investment, and demand for his product.

1. Hand out ditto sheet showing various types of chickens. See data sheet on page 153.
2. Demand is now for broilers because of "carry-out" stores such as "Colonel Sanders" and TV dinners. Demand brings new needs. Needs generate inventions, improvements in products, and better processing methods.
3. Show film "Overture Nyitany," which shows the development of a chicken embryo (available from the St. Louis County Library). "Poultry on the Farm" or "Eggs to Market" would also be appropriate (available from County Audio Visual).
4. On the K-1 grade levels a discussion of the seasonal demands for poultry would be advisable. This would lead to associations such as turkeys and Thanksgiving. On the 2-3 grade levels such a discussion could lead to a explanation of how poultry can be bred according to consumer demand, such as Honeysuckle White being bred for more white meat.
5. A bulletin board can be made from a Colonel Sanders box, a TV dinner package including the aluminum foil plate, and egg cartons (plastic, paper, styrofoam) to show how demand for products can lead to packaging methods which create pollution of the environment.
6. Egg cartons can be used to explain the term dozen.
7. Suggested field trips: chicken farm, turkey farm.
8. Suggested song: "In the Barnyard," by Dorothy Aldis and Milton Kaye, from Making Music Your Own, 2, Silver Burdett Company.

Lesson VII. Weather, Modern Technology, and Vandalism Have an Economic
- Effect on Dairy Farming

Stress: The farmer is in business. His profits are affected by many factors.

1. Suggested questions for discussion:

How do you think weather affects the dairy farmer?

Is weather always the farmer's friend?

What is meant by modern technology?

How do such things as milking machines help the farmer?

Is time important to the farmer?

Do machines increase the farmer's profit?

What is meant by vandalism?

What does the farmer do if someone takes his cows?

How and why does vandalism affect the farmer's profits?

2. Using Milliken transparencies on the overhead projector to accompany ditto sheets, talk about the many other products that animals provide in addition to food. Bring items such as pigskin gloves, cowhide belts, or other clothing which has animal skin in it. See data sheet on page

3. The song, "Sheep Shearing," from Making Music Your Own, 2, Silver Burdett Co., sets the mood for a discussion of shearing the sheep's wool. Then discuss the wool items the children own such as coats, mittens, and hats and how this clothing keeps them warm.
4. Make farm animals from large sheets of brown paper. Cut out life-size farm animals, stuff them with shredded newspaper and staple the edges. The children can paint on spots, eyes, etc. and place the animals in the room for atmosphere.
5. Hand out copies of the poem, "General Store," by Rachel Field. Have the children assist in constructing a small cardboard store or construct a wooden framework and have the children cover it with brown paper which can be decorated. Have the children bring in empty cartons from various food products that originate on the farm. This can be used to teach the concept of consumer-producer. Addition and subtraction concepts can also be correlated.

Another activity in connection with the above mentioned is to have the children draw their idea of how a general store would look.

TOPIC E: Machinery

Lesson I. The Historical Background of Farm Tools

1. After discussing early farm tools through the use of photographs from books, show how the changing needs of farmers through the years have brought progress in the area of machinery and tools.
2. Stress: Changing demand for products created needs; these needs motivated mechanical progress.
 - a. Show an illustration of an early plow and a more modern plow pulled by a tractor. See data sheet on page 139 for old plows.
 - b. Show pictures of a scythe, flail, and pitchfork. Explain how the combine has replaced all three of these tools more efficiently. See data sheets on pages 137 and 141.
 - c. Show an illustration of the farmer milking a cow by hand. Follow up with pictures of a milking machine and milk parlor. See data sheets on pages 142 and 150.
3. Place a transparency of a selected picture from a book on the overhead projector and flash it on a large strip of white paper taped to the chalkboard. Have the children take turns tracing early and later farm tools onto the paper. This can be done in the form of a mural depicting the evolution of farm tools and machinery. The children should label each of the tools. Then the mural can be given a title by the children such as "How Tools Have Changed," etc.
4. Give children a ditto sheet showing early farm tools on the top side and modern farm tools on the other side. Direct the children to use blue yarn for the early plow and match their yarn to the modern machine. Repeat with other colors of yarn for matching other tools. The yarn is glued to the paper. This activity can also be done with crayons. Use data sheets on pp. 138 & 141.

5. Have younger children use clay to model a farm with very simple tools or machinery placed around on fields. This can be done by placing white paper on a table top and dividing the paper into individual farms. Each child will have his "own farm" and may decide on a crop to grow and machinery to use.

Lesson II. Farm Machinery Is Very Functional and Can Perform More Than One Activity

1. Use ditto sheet with illustrations of a cornpicker, combine, milking machine, and cotton picker showing each functioning individually. Each child will select from grains of corn, wheat, powdered milk, and cotton the product corresponding to the function of the machine on the ditto sheet. A small sample of the product can be glued onto the ditto sheet in the appropriate box. See data sheets on pages 140, 141 and 144.
2. Introduce the song, "Cotton Needs Picking," Making Music Your Own, 2, Silver Burdett Company. This soon can lead to an activity such as pretending to pick cotton as the children sing.

Lesson III. Safety Is an Important Factor in Operating Farm Machinery. The Care of Farm Machinery Is Especially Important to the Farmer Since He Is Dependent upon It.

1. In order to make younger children aware of the importance of farm machinery, discuss the relationship between their father and his car with that of the farmer and his machinery. What would their father do if he did not have his car? How does father or mother take care of the family car? Talk about going to the doctor for periodic check-ups and discuss whether cars and machinery also need "check-ups."
2. Bring to class pieces of rusty metal and metal that has been painted. Take the children out to the playground and show them examples of rust on playground equipment. Discuss how paint protects metal. Have the children understand how "preventive medicine" can help the farmer to operate more efficiently with his machinery.
3. Following the previous introductions make an experience chart in which a piece of farm equipment is personified, such as "Tommy Tractor - His Adventures." Tommy is asking the question, "How will you take care of me?"
4. Talk about safety rules established for use of school buses. Discuss the fact that the same safety rules apply to farm machinery.
 - a. Never try to board or leave machines while they are moving.
 - b. Never make repairs while the motor is running.
 - c. Never keep the machine's motor running when the door to the garage or barn is closed.
 - d. Make repairs to school buses when school is not in session and to farm equipment before planting or harvesting time so that

the machines do not delay the processes for which they were designed.

5. Make posters using safety slogans such as "Safety on the Farm," "Safe Machines Mean Safe Farmers," and "Good Machines - Good Profits." Cut old newspapers into the shapes of farm machines and glue onto colored backgrounds. Letters can be cut out of newspapers or painted.

Lesson IV. How Will Future Changes in Farm Machinery Affect Animal Life, the Natural Environment, and the Consumer?

1. Discuss the use of imagination with the children. Remind them of the changes that have occurred in tools and machinery since the Colonial Period and ask them to close their eyes and imagine what the farm of the future will be like. What kind of machinery do you see in your imagination?
2. Ask the children to bring to class empty Baggies boxes containing paper rollers. Have the children make science fiction movies. They can be given rolls of white paper to draw their conception of what a future farm will look like. The rolls can be taped to the paper rolls and would up like a movie film. Cover the Baggies boxes with aluminum foil and paint, you can bring buttons for the knobs.
3. Have the children make collages using scraps of material that are associated with machines (bottle caps, jar lids, screws, nuts, bolts, rubber washers). These can be mounted on a board brought from home, stapling colored burlap over it.
4. Have the children bring cardboard boxes, rope, etc. to make miniature farm machinery.

TOPIC F: The Farm of the Future

1. Read the book, Food from Farm to Home. Show the pictures of the author's conception of the farm of the future. As is pointed out, the farmer must think about what he is doing to the environment. Write and illustrate a story about "The Push Button Farm."
2. If a dairy farm now costs nearly 1 million dollars to operate, have the children hypothesize orally how much they think a farm will cost approximately thirty years from now.
3. After viewing the film "Our Changing Family Life" (comparison of farm life in 1880 with present) discuss the present-day farm. Visit a farm of today with the children and try to visualize with them what it will be like in years to come. (Purina Farm, a farm close to the school, or perhaps one familiar to a parent of one of the class members.)
4. Have a breakfast in the classroom, inviting the parents to come. This should be planned after studying about four basic food groups, nutrition, and why it is important to have a good breakfast.



Four Basic Food Groups

4. Have the children help set the tables at their desks. Serve meat and serve sausages, orange juice, milk, cereal, toast and little doughnuts. Serve the parents coffee and sweet rolls. Have a little entertainment.
5. Make a bulletin board or a mural with a big crystal ball to represent the farm of the future. The students will then draw their concept of what the farm of the future will be, considering the ecological information being gathered today. (Buildings, machinery, crops, transportation, etc.) They will cut out their pictures and place them on the bulletin board. If feasible, place this bulletin board next to the first picture of the farm to illustrate the comparison of today's farm and the future farm.
6. Put on a fair with several kinds of booths. (One of the booths could demonstrate, by use of pictures and stories the future farms of America. One could exhibit posters on environment. Several booths might have games; one exhibit soil, rocks, weather, air and animals; one selling preserves or pickles (homegrown or homemade); another stitchery and prizes of blue ribbons, or red ribbons. Food booths, etc. might be included. The fair can encompass the economics of the farm, activities of the farm, fun on the farm, etc.
7. Use the "Magic Box." This is done after the discussion of our five senses. The teacher places objects in the box to test the five senses. After being blindfolded, they take one object from the box. Using their five senses, they describe and identify the object. Use farm objects.
8. Another enjoyable game to play after discussing the things that are found on the farm is, "I Am Thinking Of." The words must rhyme. For example, "I am thinking of a word that rhymes with meat. You make bread from this and the word is. . . (wheat)." "I am thinking of a word that rhymes with plow. It gives milk and the word is. . . (cow)."
9. Another game which tests vocabulary/dictionary skills and spelling of words pertaining to the unit on Farm is called "The Hangman Game." The scaffold and spaces for letters are drawn 1 - - - - - . The children are told that there are 7 letters in a word that you are thinking about. Going around the room, each child guesses a letter of the alphabet. If a given letter is contained in the word, write it in over the broken lines in its proper sequence. However, each time a child gives you a letter not contained in the word, write it above the scaffold and fill in a part of the body. The object of the game is for the class to identify the word before the man is completely drawn or "hung." Children really enjoy this game, and the entire group can participate.



c c o l o g y

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10. Suggest to the children that they start their own gardens. It is enjoyable to make a garden, to eat vegetables you've grown yourself, or to watch your flowers bloom. Ask your parents for a small plot of ground in your yard, or find one in an empty lot. Be sure the ground you choose gets full sunshine most of the day. Perhaps someone will help you spade the ground. (This means digging up spadefuls of earth and turning them over.) Then smooth the soil with a rake. Before buying seeds, you should consult your parents about what you want to plant, and about what will grow best in your soil. Seeds come in packages that tell you how to plant them. The directions on the packages will also tell you when to plant the seeds (the season and the month). With a sharp stick or the corner of a hoe, dig a small furrow in which to distribute the seeds. Push the soil back over the seeds with the hoe or stick. When your plants begin to grow remember to pull out the weeds and to loosen the soil. Water your garden if the soil looks dry or cracked. (This project will give children an appreciation of the prerequisites needed established by the farmer in order to grow his crops.)

TOPIC G: Careers

Lesson I. A Day in the Life of a Farmer

1. Have the children role play a farmer meeting many different types of people that will help him on the farm. (See career list in background information on page 52.)

Upon completion of all activities, give the pre-post test again, which can be found on pages 7-15 (for grades K-1) and 16-19 (for grades 2-3).

BIBLIOGRAPHY

SELECTED FREE MATERIALS

National Cotton Council of America, P. O. Box 12285, Memphis, Tenn. 38112. Variety of materials about cultivation and uses of cotton. Poster "Cotton," shows stages of cotton processing from the plant to the consumer; single copy per classroom. Booklets: "The Story of Cotton," maximum of 25 copies (3rd - 12th grades); "Cotton: How It Is Grown," and "Cotton: Facts about Fiber and Fabric," maximum of 25 copies each; "Cotton from Field to Fabric," single copies to educators only. Request "Cotton Educational Aids" for complete listing of materials on cotton available from all sources.

International Harvester Company, Educational Services, 401 North Michigan Avenue, Chicago, Illinois 60611. Variety of materials on agricultural subjects; requests filled from available supplies. Request annotated listing of 16 mm. color, sound films (K - adult).

Massey-Ferguson, 1901 Bell Avenue, Des Moines, Iowa 50315. Farming and heavy equipment. Booklets: "Farming for the Future," "No Sheaves in the Fields," and "Where the Harvest Begins." Materials also useful for business. (Grades 5-12. For teacher reference).

State Divisions of Forestry supply materials on fire prevention and conservation of natural resources, including teachers' kits on forest fire prevention and conservation, and the campaign guide for the yearly fire prevention program.

National Plant Food Institute, 1700 K Street, N.W., Washington, D.C. 20006. Soil conservation and care. Booklets: "Our Land and Its Care," and "What is Fertilizer?" Limited copies to teachers. (For teacher reference).

National Dairy Council, 111 N. Canal Street, Chicago, Illinois 60606. Variety of materials designed to promote optimum health through good nutrition. Request "Health Education Materials Catalog" for complete listing of reference materials, booklets, posters, films, filmstrips, charts, and panorama kits especially developed for use in educational programs. (K-adult)

Soil Conservation Service, U.S. Dept. of Agriculture, Washington, D.C. 20250. Variety of materials on soil and water conservation. Booklet: "The Soil that Went to Town," AIB-95. (K-6)

FILMS

- I. 16 mm films available from:
Missouri Conservation Department
St. Louis Office
1221 South Brentwood Boulevard
St. Louis, MO 63117
726-6800

1. "The Golden Secret" - 7 minutes
This picture takes conservation to the fairy story audience. It is a fairy tale about the golden topsoil being washed away and what the son of the king's chief huntsman did to stop it. It is a cartoon movie, but not animated; the art work is excellent.
2. "Grey Owl's Little Brother" - 12 minutes
The story tells of an Indian naturalist and his friendship with a beaver which he names "Little Brother."
3. "Trees for Tomorrow" - 16 minutes
Tree farming and the value of wood and wood products to modern man are described in this film.
4. "Trees to Paper" - 12 minutes
This film shows the making of paper from pulpwood.
5. "Woodland Manners" - 19 minutes
This picture shows that it is up to every person who visits outdoor recreational areas to observe certain necessary sanitary measures, to be careful with fire, and to use just plain good American manners by leaving his picnic spot in as good or better condition than he found it.
6. "Once Upon a Time" - 15 minutes (silent 16mm)
A good film for children, best utilized if the teacher previews it first. She could then talk while the film is being shown.

II. 16mm films available through County Audio-Visual

1. "Wonders of Plant Growth"
2. "Rocks for Beginners"
3. "Erosion"
4. "Wonders in Your Own Backyard"
5. "Day at the Fair"
6. "Milk"
7. "Ants! Backyard Science"

8. "Country Store"
9. "Miss Bossy Goes to Town"
10. "Farm Animals"
11. "Poultry on the Farm"
12. "Pigs"
13. "Eggs to Market"

III. 16mm sound films available from the St. Louis County Library

1. "Adventures of Bunny Rabbit" - 11 minutes
2. "America the Beautiful" - 20 minutes
3. "American Cowboy" - 30 minutes (4-6)
4. "Animals in Autumn" - 11 minutes
5. "Autumn on the Farm" - 11 minutes
6. "Barnyard Brat" - 10 minutes (teaching manners)
7. "Be Healthy! Be Happy!" - 11 minutes (good health rules)
8. "Cattle Ranch" - 21 minutes (yearly cycle on ranch)
9. "Children in Spring" - 11 minutes
10. "Children in Winter" - 11 minutes
11. "Chimp on the Farm" - 10 minutes
12. "Christmas in Appalachia" - 29 minutes (4-6)
13. "Conservation: A Job for Young America" - 19 minutes
14. "County Fair" - 16 minutes (significance of the fair to the farm family.)
15. "Cow and the Sprite" - 10 minutes (puppets)
16. "Farm Babies and Their Mothers" - 10 minutes
17. "Food and People" - 28 minutes (4-6) (documentary - world's food problems)
18. "Forest Ranger" - 12 minutes
19. "Frisky, the Calf" - 10 minutes
20. "Frontier Boy of the Early Midwest" - 16 minutes

21. "The Giant Forest" - 14 minutes
22. "The Green City" - 23 minutes (spread of urbanization)
23. "Health in Our community" - 13 minutes (work of Dept. of Health)
24. "I'm No Fool with Fire" - 8 minutes
25. "Johnny Appleseed" - 12 minutes
26. "The Legend of Johnny Appleseed" - 20 minutes
27. "Life on a Cattle Ranch" - 10 minutes
28. "The Litterbug" - 8 minutes (Donald Duck)
29. "Little Red Hen" - 10 minutes
30. "Little Smokey" - 10 minutes (origin of Smokey Bear)
31. "Missouri, a Living Portrait" - 24 minutes
32. "Missouri State Parks" - 29 minutes (recreation areas)
33. "Nature's Half Acre" - 33 minutes (life cycle of plants and animals through the four seasons)
34. "Nicky and Rock - Working Sheep Dogs" - 22 minutes
35. "Nineteen Trees" - 14 minutes (preserving trees in the city)
36. "No Fires, Please!" - 10 minutes (comedy skit)
37. "Origins of Weather" - 13 minutes (4-6)
38. "Our Changing Family Life" - 22 minutes (comparison of farm life in 1880 with the present)
39. "Our Springtime Wild Flowers" - 12 minutes
40. "Overture Nyitany" - 9 minutes (development of chicken embryo)
41. "Ozark Float Trip" - 12 minutes
42. "Peg of the Prairie" - 14 minutes (care of calf)
43. "Pests or Plenty" - 13 minutes (U.S. Dept. of Agriculture film)
44. "Pioneer Community of the Midwest" - 14 minutes
45. "The Pony" - 30 minutes
46. "The Price of Fire" - 23 minutes
47. "Pride, the Saddle Horse" - 11 minutes

48. "Quail Hunt" - 10 minutes
49. "Rainshower" - 15 minutes
50. "The Redwoods" - 20 minutes
51. "A Rock in The Road" - 6 minutes
52. "Secrets of the Ant and Insect World" - 13 minutes (Walt Disney)
53. "Secrets of the Bee World" - 13 minutes (Walt Disney)
54. "Secrets of the Plant World" - 15 minutes (time-lapse photography)
55. "Seeds of Destruction" - 10 minutes (effects of fire, wind, and erosion on the forests)
56. "Seven Little Ducks" - 10 minutes
57. "Shep, the Farm Dog" - 11 minutes
58. "Something You Didn't Eat" - 10 minutes (Walt Disney - nutrition)
59. "Sparky, the Colt" - 10 minutes
60. "The Spider and the Ant" - 9 minutes
61. "Spring on the Farm" - 11 minutes
62. "A Strand Breaks" - 15 minutes
63. "Strands Grow" - 15 minutes
64. "The String Bean" - 17 minutes (prize-winning art film)
65. "Summer on the Farm" - 11 minutes
66. "Tale of the Redwoods" - 20 minutes
67. "The Changing Forest" - 19 minutes (shows forest as an integrated community)
68. "Three Little Pigs and Little Red Hen" - 20 minutes (K-1)
69. "Time Changes the Land" - 20 minutes (land formations)
70. "Tree Grows for Christmas" - 11 minutes (cutting as good forestry)
71. "Tree Portraits" - 19 minutes (shows forest as it changes through the year through time-lapse photography)
72. "Uncle Jim's Dairy Farm" - 10 minutes
73. "Urbanissimo" - 6 minutes
74. "Visit with Cowboys" - 10 minutes

- 75. "Water" - 15 minutes
- 76. "Winter on the Farm" - 11 minutes
- 77. "Wonderful World of Bulbs" - 22 minutes
- 78. "You and Your Blood" - 8 minutes (Jiminy Cricket)

FIELD TRIPS

Trips to tree farms, nurseries, and greenhouses will give the children a better understanding of plants, their growth and development. For information on Eckert's, which is a fruit growing farm that has a store in our area, the teacher can check with the Des Peres store located at 13133 Manchester Road. For information on Nettie's Flower Shop, located at Grand and Chippewa, check the Yellow Pages. Tours should be arranged through the business office.

Trips to turkey, chicken, or dairy farms will help children to better understand animals.

Trips to feed stores, farm machinery stores, and hatcheries will also add to the child's understanding of the farm and its functions.

Trips to the zoo and Grant's Farm will give the child further information on animals.

Other:

Eckert's Country Store. One may call 821-6462 to arrange for a field trip to Belleville, Illinois. Meat processing, cooling, cutting, or livestock killing may be seen at the slaughter house in Belleville. Also, Eckert has an orchard where one may pick apples in the fall and peaches in the summer. Strawberries can be picked during the spring. One should check with Eckert's County Store for the best time to pick at any one of their several orchards.

BIBLIOGRAPHY OF RESOURCE MATERIAL

Teacher Reference Books

The majority of the following books can be obtained from the St. Louis County Library.

Bethers, Ray, Perhaps I'll Be a Farmer. New York: E. P. Dutton, 1950

Blough, Glenn O., Useful Plants and Animals, Row, Peterson, Co., 1951.

Buehr, Walter, Food from Farm to Home, New York: William Morrow and Company, 1970.

Clark, Carol E., Rhythmic Activities for the Classroom. Dansville: Instructor Publications, Inc., 1959.

Colby, C. B., Earthmovers. New York: Coward-McCann, Inc., 1955.

Contours of Change - The Yearbook of Agriculture 1970, Department of Agriculture, Washington D.C., 1970.

Gelb, Donald L., What Will I Be from A to Z. Chicago: National Dairy Council, 1971.

Gilbert, Miriam, Starting a Terrarium. C. S. Hammond & Co., 1961.

Hamilton and Bryant, Profitable Farm Management. Englewood Cliffs: Prentice-Hall, Inc., 1963.

Howard, Robert West, Farms. New York: Franklin Watts, Inc., 1967.

Hutchins, Ross Elliott, This is a Leaf. New York: Dodd-Mead and Co., 1962.

Jacobs, Leland B., Just Aaround the Corner, Holt-Rhineholt, 1964.

Klein, Richard M. and Deana T., Discovering Plants. Garden City: The Natural History Press, 1968.

Larrick, Nancy, Piper, Pipe that Song Again. New York: Random House, 1965.

Martin, Richard A. and Fitch, Alice, You and Your Work and Play. New York: Golden Press, 1962.

Making Music Your Own - Books 1 and 2, Silver Burdett Publishing Co.

Parker, Bertha Morris, The Air About Us. University of Chicago, Laboratory School: Row, Peterson and Co., 1952.

Parker, Bertha Morris, Soil. Evanston: Peterson, Row and Co., 1955.

Preston, Charles, Crossword Puzzles. New York: Treasure Books, Grades 4-5.

Pringle, Laurence P., editor, "Discovering the Outdoors," Natural History, 1969.

Russell, David H. and Elizabeth F., Listening Aids Through the Grades. Teachers College Press, Teacher College, Columbia University, 1965.

Russell, Solveig Paulson, The Farm. New York: Parents' Magazine Press, 1970.

Sullivan, George, How Do They Grow It? The Westminster Press, 1968.

Syrocki, B. John, What Is Soil? Benefic Press, Atlanta, 1961.

Talley, Naomi, To Save the Soil. The Dial Press, 1965.

"Things to Make Month by Month," The Grade Teacher, CCM Professional Magazine, Inc., 1970.

Through the Year With World Book, Field Enterprises Educational Corporation, 1960.

The Yearbook of Agriculture 1966, Government Printing Office, Department of Agriculture, Washington, D. C., 1966.

Werner, Jane, editor, The Golden Book of Mother Goose. New York: Golden Press, 1949.

Wheeler, Jesse H., Jr., Kostbade, J. Tranton, and Thomas, Richard S., Regional Geography of the World, New York: Holt, Rhinehart, and Winston, 1961.

World Book Encyclopedia - Volumes A, C, F, Field Enterprises Educational Corporation, 1965.

STUDENT REFERENCE BOOKS

Ecology

Adrian, Mary (Pseud.), A Day and a Night in the Arctic, The Balance of Nature Series, 1970. (Grades 3-4)

Bendick, Jeanne, A Place to Live. A Stepping-Stone Book, 1970.

Heady, Eleanor B. and Harold F., High Meadow: The Ecology of a Mountain Meadow. (Grades 4-6)

Conservation

Bronson, Wilfrid Swancourt, Freedom and Plenty: Ours to Save, Harcourt, 1953. (Grades 3-4)

Gates, Richard, True Book of Conservation, 1959. (Grades 1-3)

Green, Ivah E., Conservation from A to Z. (Grades 3-4)

Green, Ivah E., Water: Our Most Valuable Resource. (Grades 4-6)

Hogner, Dorothy Childs, Conservation in America. Lippincott.

Smith, Frances, C., First Book of Conservation. (Grades 3-4)

Farm Ponds

Meeks, Esther MacBain, Jeff and Mr. James' Pond. (Grades 1-3)

Animals

Blough, Glenn O., Who Lives in this Meadow? (Grades 3-4)

Darby, Gene, What Is A Chicken? Benefic Press, 1957.

Darby, Gene, What Is A Cow? Benefic Press, 1957.

Dodd, Madeline M., All Kinds of Cows. 1965. (Grades 3-4)

Dugdale, Vera, Album of North American Animals. (Grades 4-6)

Ipcar, Dahlov Zorach, I Like Animals. (Grades 1-3)

Laycock, George, Animal Movers: A Collection of Ecological Surprises. (Grades 4-6)

Mason, George Frederick, Animal Appetites. (Grades 4-6)

Wong, Herbert H. and Vessel, Matthew Francis, Our Trees: Science Series for the Young.

Plants (Propagation)

Black, Irma Simonton, Busy Seeds. (Grades 1-2)

Webber, Irma Eleanor, Bits that Grow Big: Where Plants Come From.
(Grades 3-4)

Plants

Adler, Irving and Ruth, Insects and Plants: The Reason Why Series.
(Grades 3-4)

Baker, Samm Sinclair, The Indoor and Outdoor Grow-It Book.

Blough, Glenn O., Plants Round the Year. Row-Peterson. (Grades 4-6)

Budlong, Ware and Fleitzer, Mark H., Experimenting with Seeds and Plants.

Cosgrove, Margaret L., Plants in Time: Their History and Mystery.

Darby, Gene, What Is a Plant? Benefic Press, 1960.

Dickinson, Alice, The First Book of Plants. Watts, 1953.

Dodd, Madeline M., All Kinds of Cows, 1965. (Grades 3-4)

Guilcher, Jean Michel and Noailles, Robert Henri, A Fruit Is Born.
Sterling, 1960. (Grades 4-6)

Lane, Ferdinand Cole, All About the Flowering World. Cadmus, 1956.
(Grades 4-6)

Lubell, Winifred and Cecil, Green Is for Coloring.

Miner, Opal Irene, The True Book of Plants We Know. Children's Press,
1953. (Grades 1-3)

Neurath, Marie Reidemeister, How Plants Grow. Sterling, 1961.
(Grades 3-4)

Soil

Bartlett, Margaret Farrington, Down the Mountain: A Book About the Ever-
Changing Soil, Scott 1963. (Grades 1-3)

Colby, C. B., Soil Savers.

Evans, Eva Knox, The Dirt Book: An Introduction to Earth Science.
(Grades 4-6)

Norling, Josephine Stearns and Ernest, Ralph, Pogo's Farm Adventure: A Story of Soil, Holt, 1948. (Grades 3-4)

Shannon, Terry, About the Land, the Rain, and Us. Melmont, 1963. (Grades 3-4)

Talley, Naomi, To Save The Soil, Dial, 1965. (Grades 4-6.)

Van Dersal, William Richard, The Land Renewed; The Story of Soil Conservation. (Grades 4-6)

Related Farm Stories

Anderson, Clarence William, Pony for Linda, MacMillan, 1951. (Grades 1-3)

Balch, Glenn, Stallion King, Crowell, 1960. (Grades 3-4.)

Barr, Catherine, A Horse For Sherry, Walck, 1963. (Grades 1-3.)

Beaty, John Yocum, Story Pictures of Farm Work, Beckley, 1950. (Grades 1-3.)

Bialk, Elisa, Tizz, Children's Press, 1955. (Grades 3-4.)

Bialk, Elisa, Tizz and Company, 1958.

Bialk, Elisa, Tizz in Cactus Country, 1964.

Bialk, Elisa, Tizz on a Horse Farm, 1964.

Bialk, Elisa, Tizz Takes a Trip, 1956.

Enright, Elizabeth, Thimble Summer.

Flanagan, Geraldine Lux, Window into an Egg; Seeing Life Begin, 1969. (Grades 4-6.)

Floethe, Louise Lee, Cowboys on the Ranch, Scribner, 1959. (Grades 1-3.)

Gartland, Robert A., Cowboys and Cattle, Coward, 1962. (Grades 1-3.)

Gringhuis, Dirk (Pseud.), Of Cabbages and Cattle; The Story of America's Farms, Dial., 1962. (Grades 4-6.)

Howard, Robert West, Farms; Photographs, Garden City, 1967. (Grades 4-6.)

Howard, Robert West, Real Book About Farms, Garden City, 1952. (Grades 4-6.)

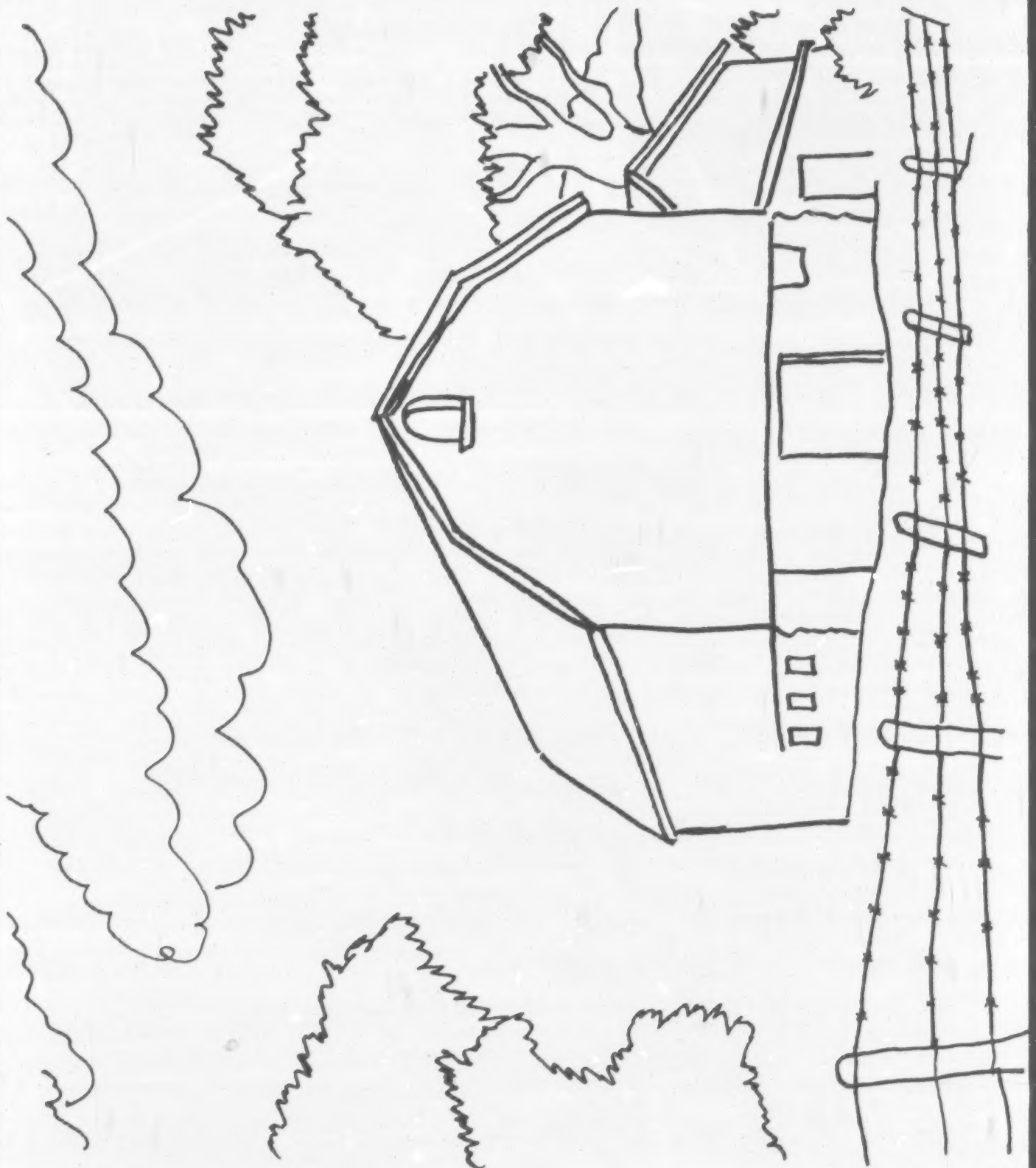
Johnson, Eleanor Murdock, Cowboys, Merrill, 1950, (Grades 1-3.)

La Farge, Olivar, Mother Ditch.

Lenski, Lois, Corn-Farm Boy, Lippincott, 1954.

- Lent, Henry Bolles, Grindstone Farm, MacMillan, 1935. (Grades 4-6.)
- Lewellen, John Bryan, The True Book of Farm Animals, Children's Press, 1954.
- Liffring, Joan, Ray and Stevie on a Corn Belt Farm, Follett, 1956.
- Liffring, Joan, Dee and Curtis on a Dairy Farm, Follett, 1957.
- Liffring, Joan, Jim and Allan on a Cotton Farm, Follett, 1959.
- Liffring, Joan, Mike and Dick on a Washington Apple Farm, Follett, 1962.
- Mannheim, Grete, Farm Animals, Knopf, 1964.
- Martinson, Helen and Melvin, Grandpa's Farm, Children's Press, 1949.
- Mason, Miriam Evangeline, Smiling Hill Farm, Ginn, 1936. (Grades 3-4.)
- McCrory, Mae, Life on the Farm, Merrill, 1939. (Grades 1-3.)
- Norling, Josephine Stearns, and Earnest, Ralph, Pogo's Farm Adventure; A Story of Soil, Holt, 1948. (Grades 3-4.)
- Rifkin, Lillian, When I Grow Up I'll Be A Farmer, Cadmus, 1944. (Grades 4-6.)
- Russell, Solreig Paulson, The Farm; A Stepping-Stone Book, 1970.
- Sootin, Laura, Let's Go to a Farm, Putnam, 1958.
- Sorensen, Virginia, Miracles on Maple Hill.
- Stever, Dorothy Voorhies, The Wholesale Produce Market, Melmont, 1955. (Grades 3-4.)
- Tefft, Bess Hagaman, Ken of Centennial Farm, Follett, 1959. (Grades 4-6.)
- Tensen, Ruth Marjorie, Come to the Farm, Reilly, 1949. (Grades 1-3.)
- Weiss, Edna, Sally Saucer.
- Yates, Elizabeth, A Place for Peter.

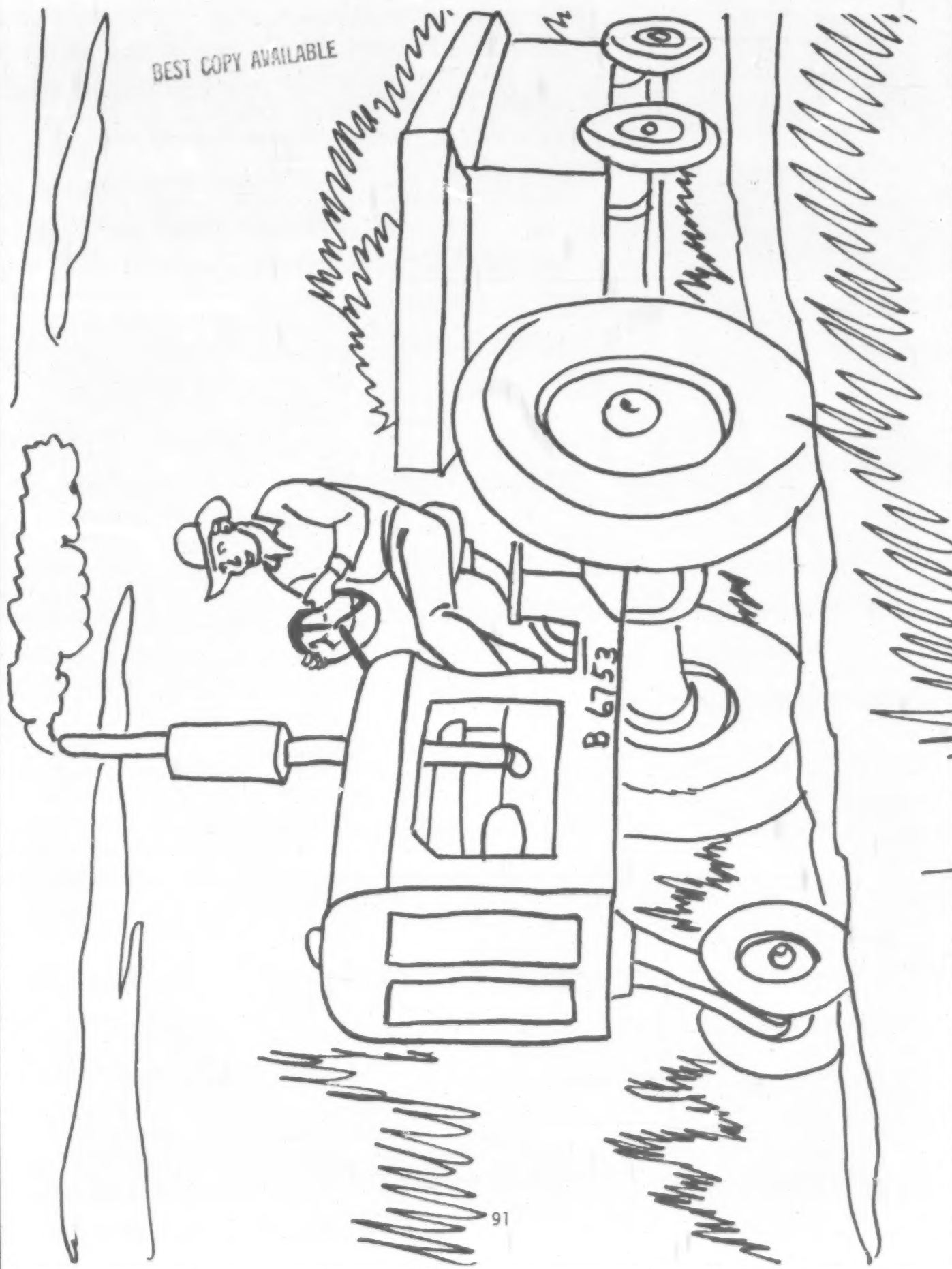
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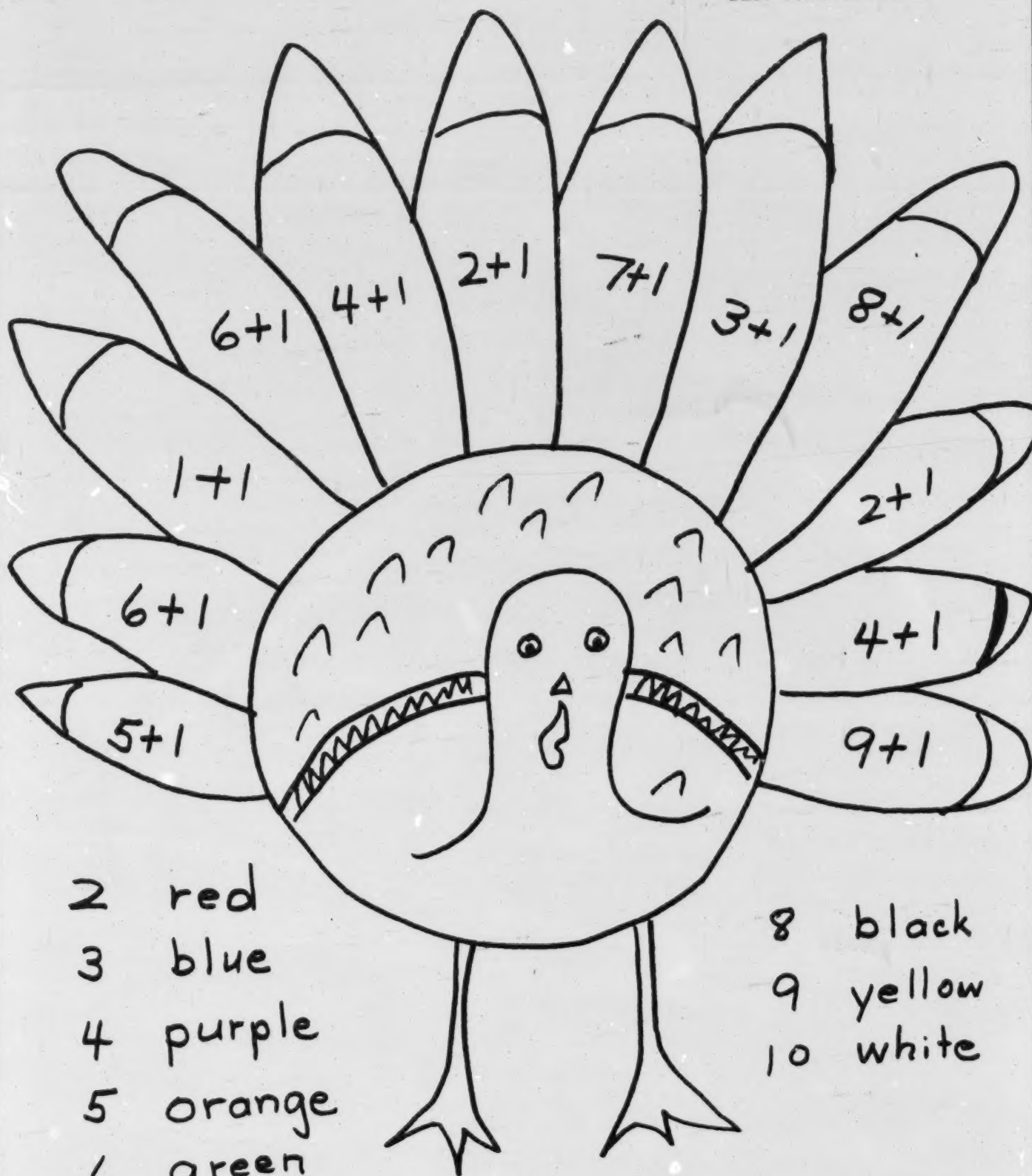
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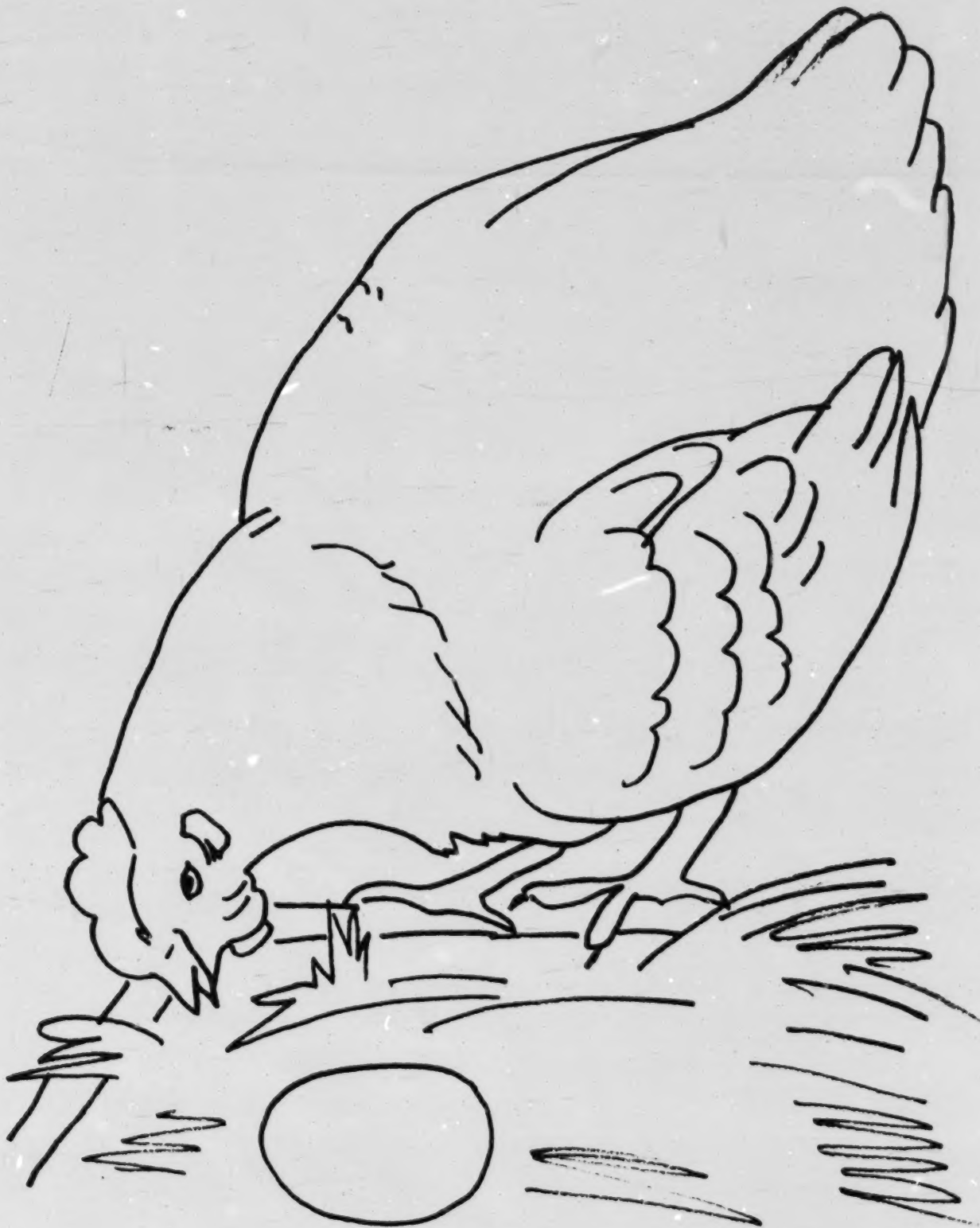
- 1 red
- 2 brown
- 3 yellow
- 4 orange
- 5 green



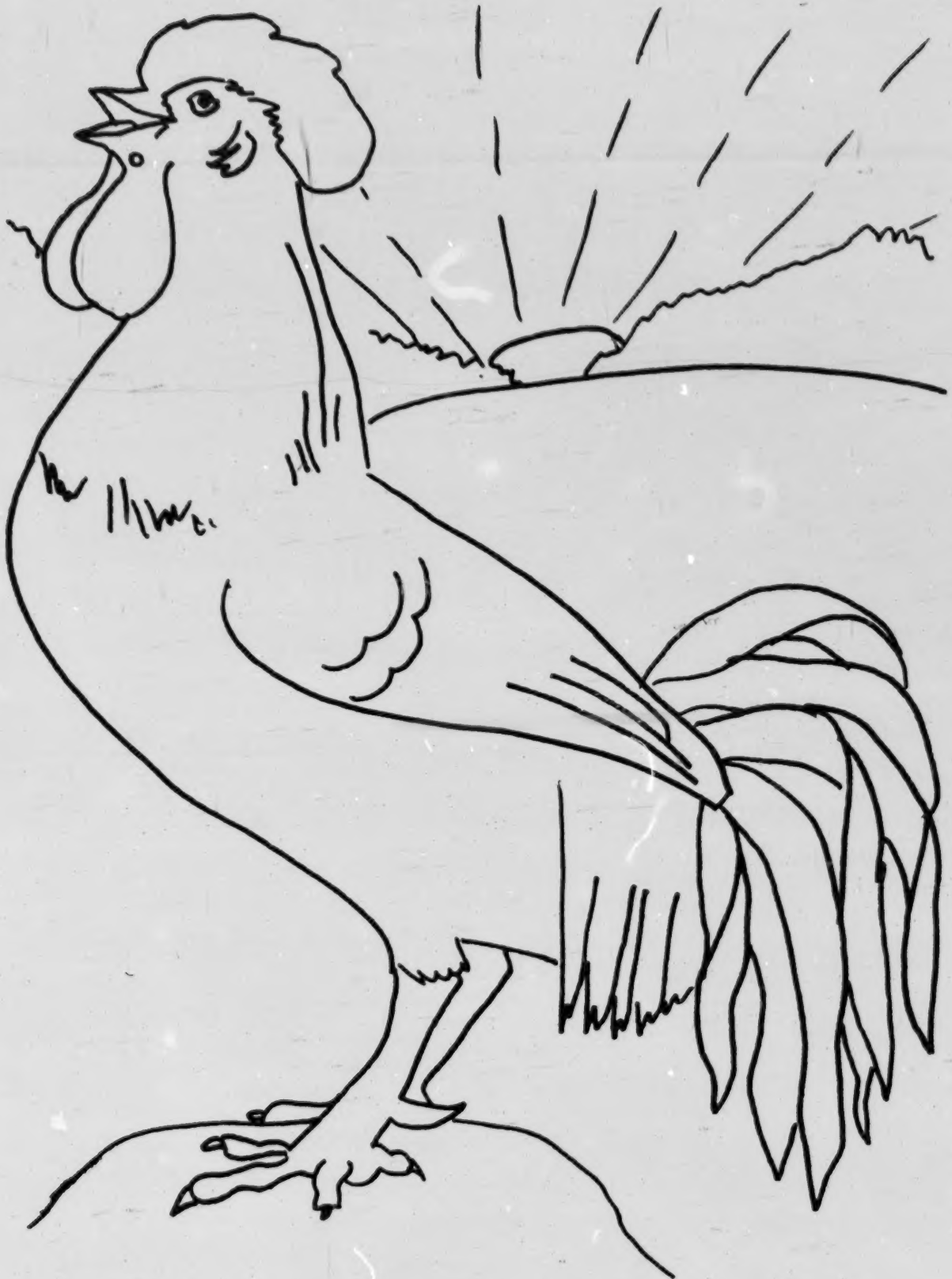
- 2 red
- 3 blue
- 4 purple
- 5 orange
- 6 green
- 7 brown

- 8 black
- 9 yellow
- 10 white

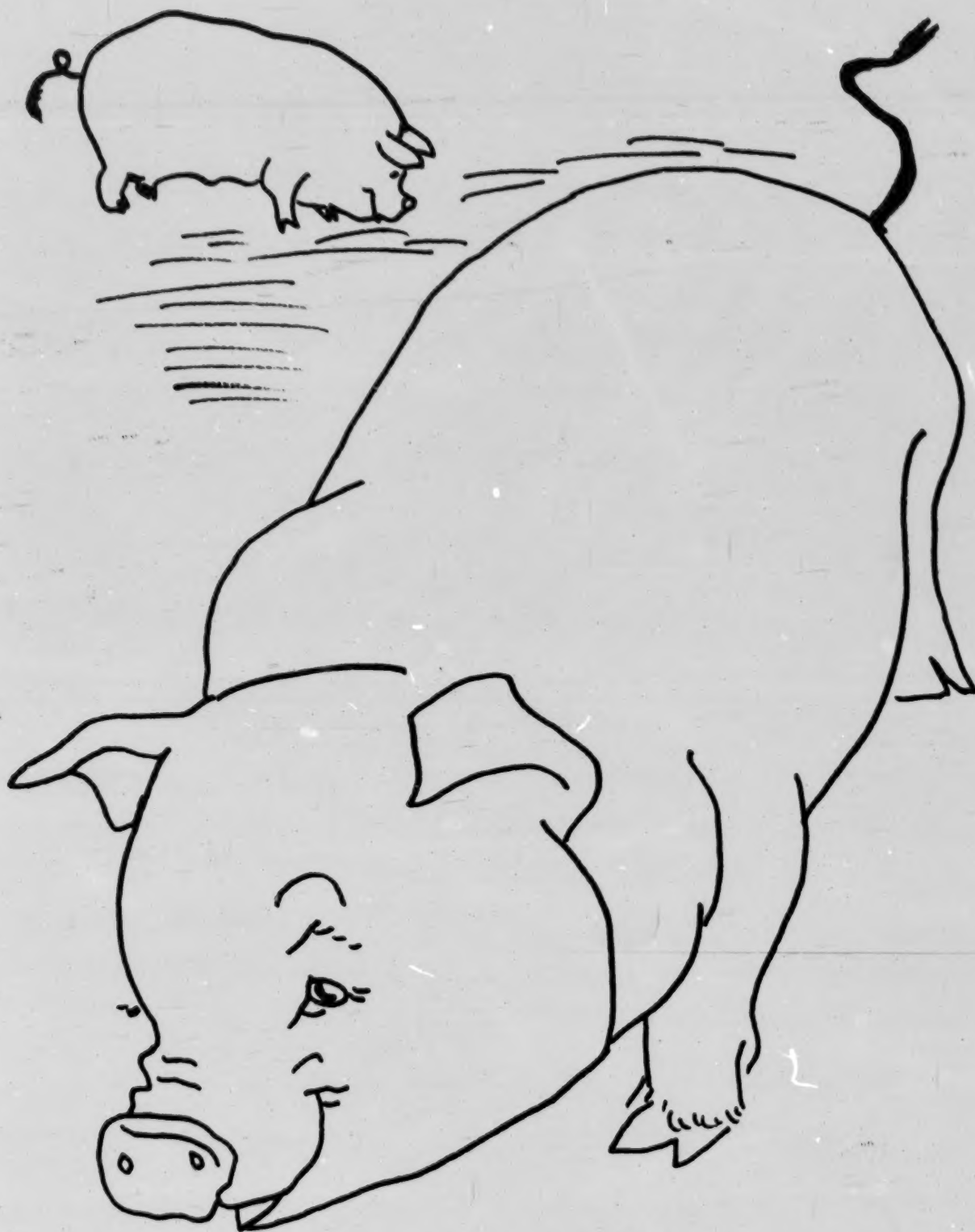
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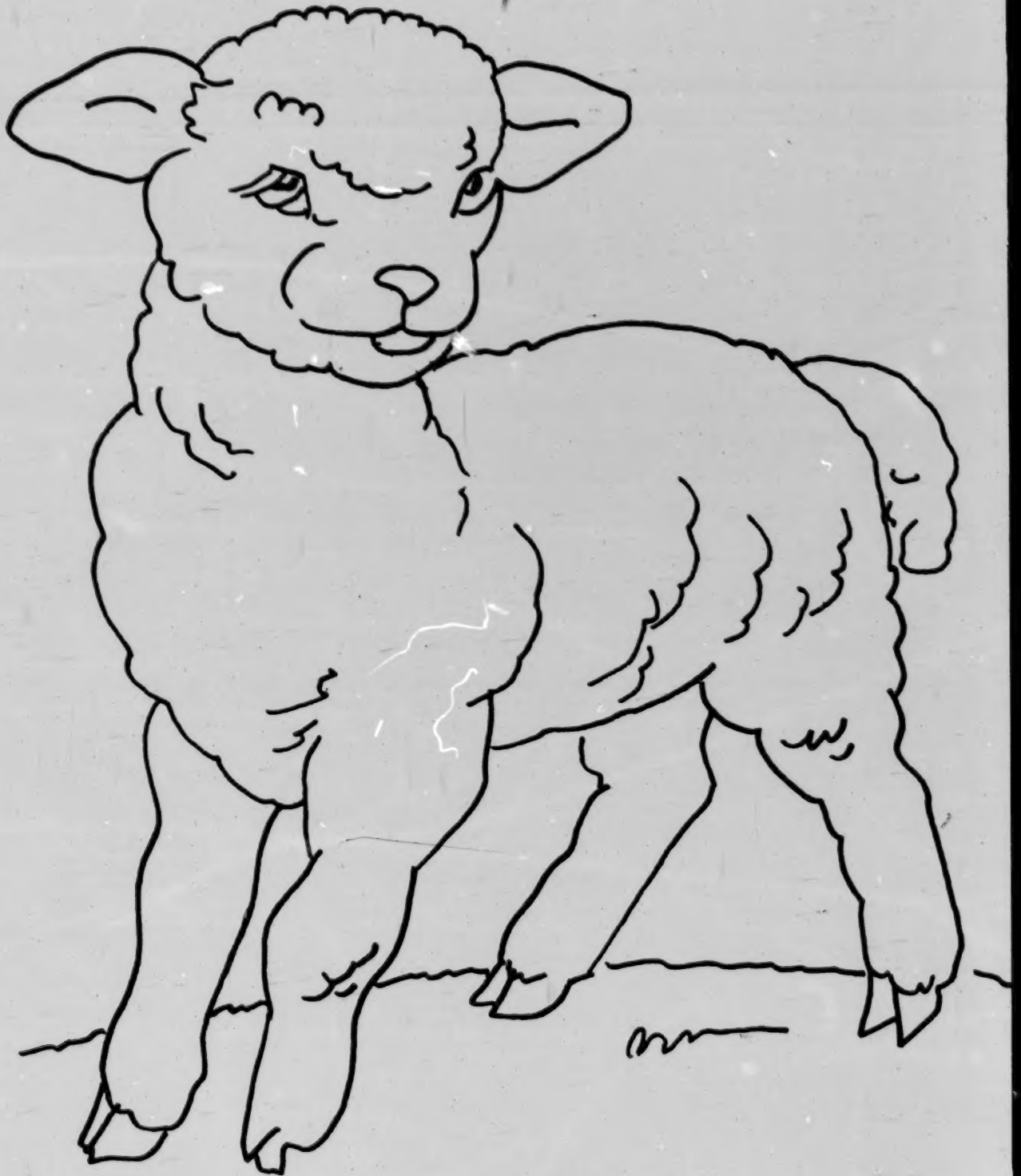
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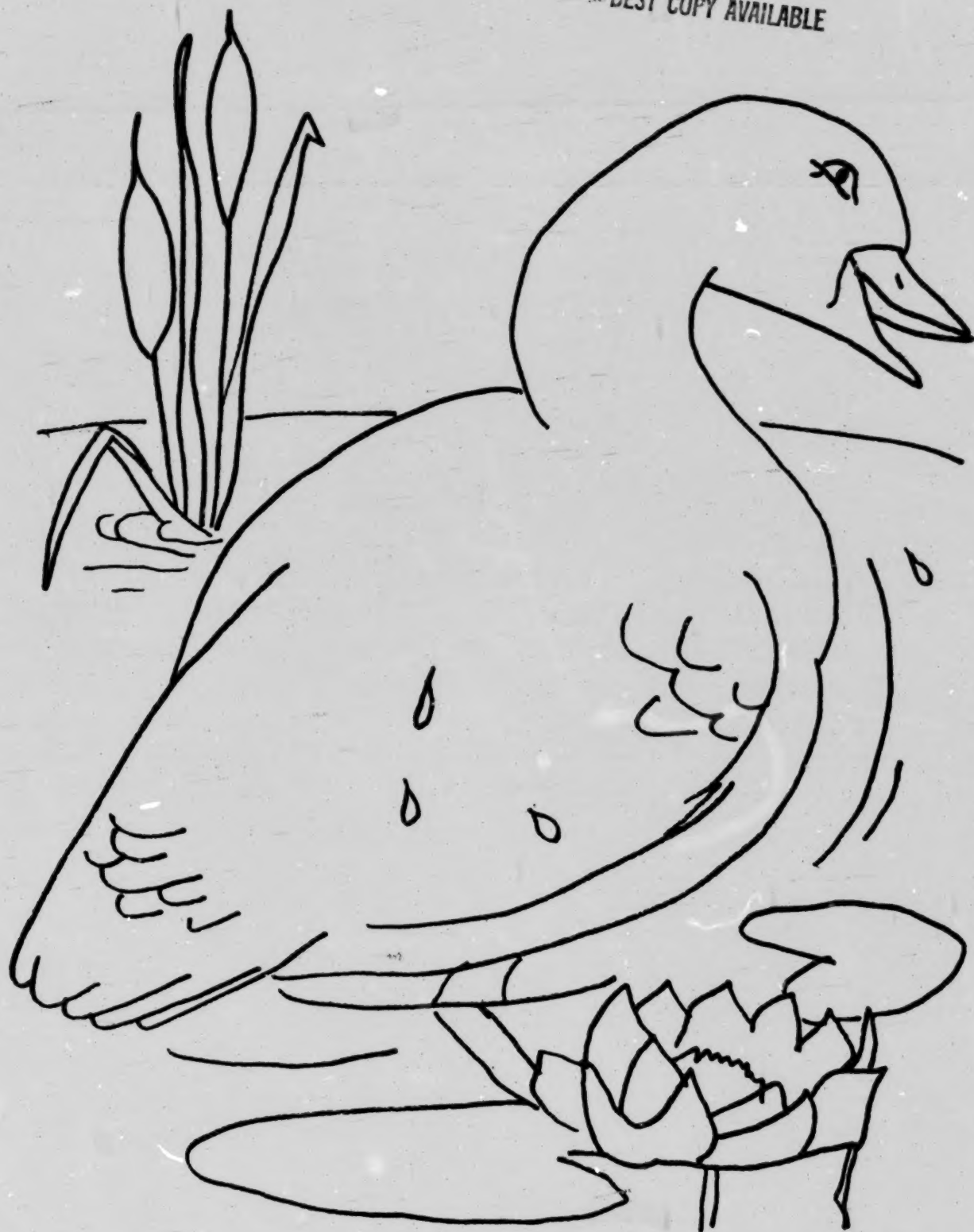
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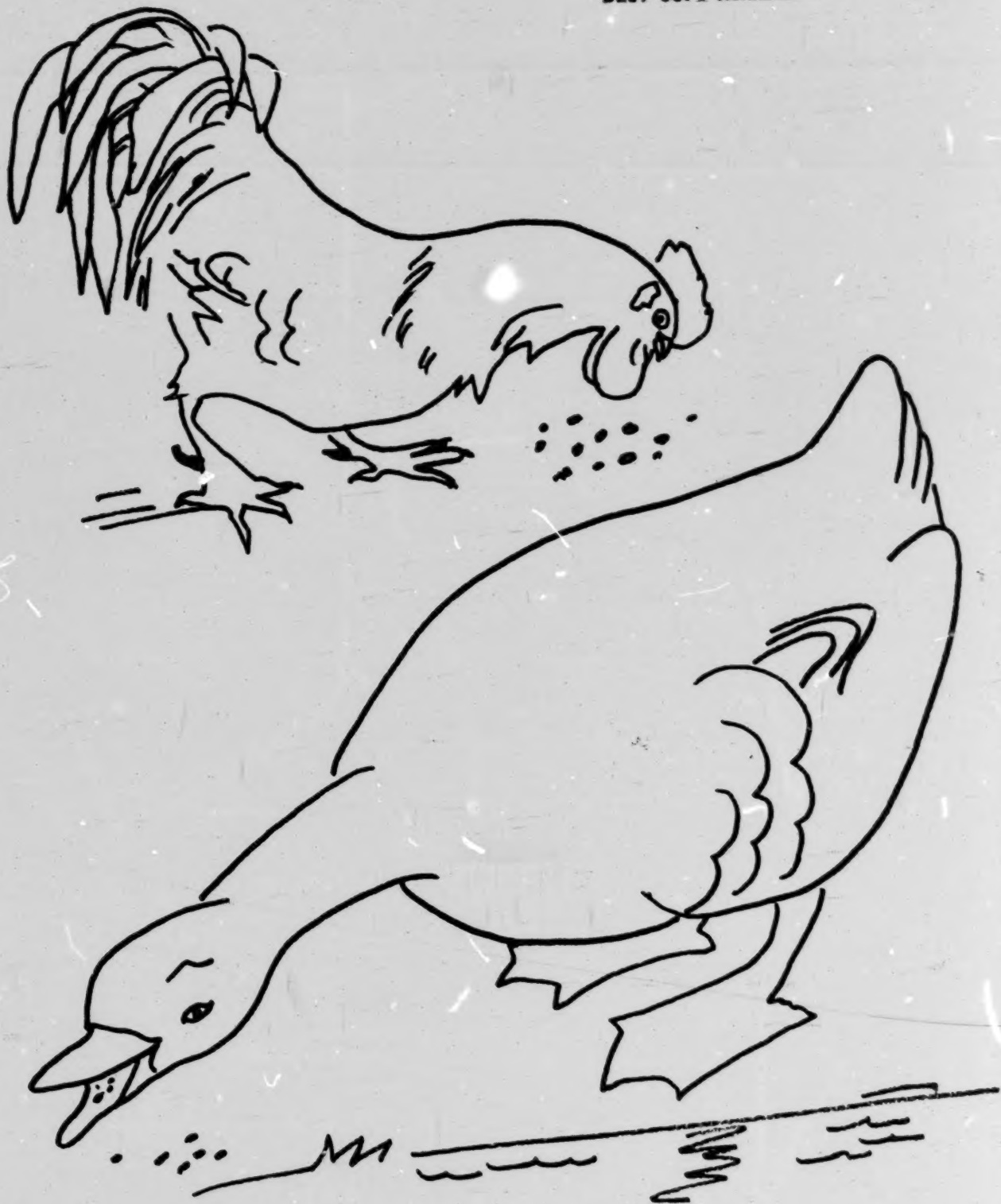
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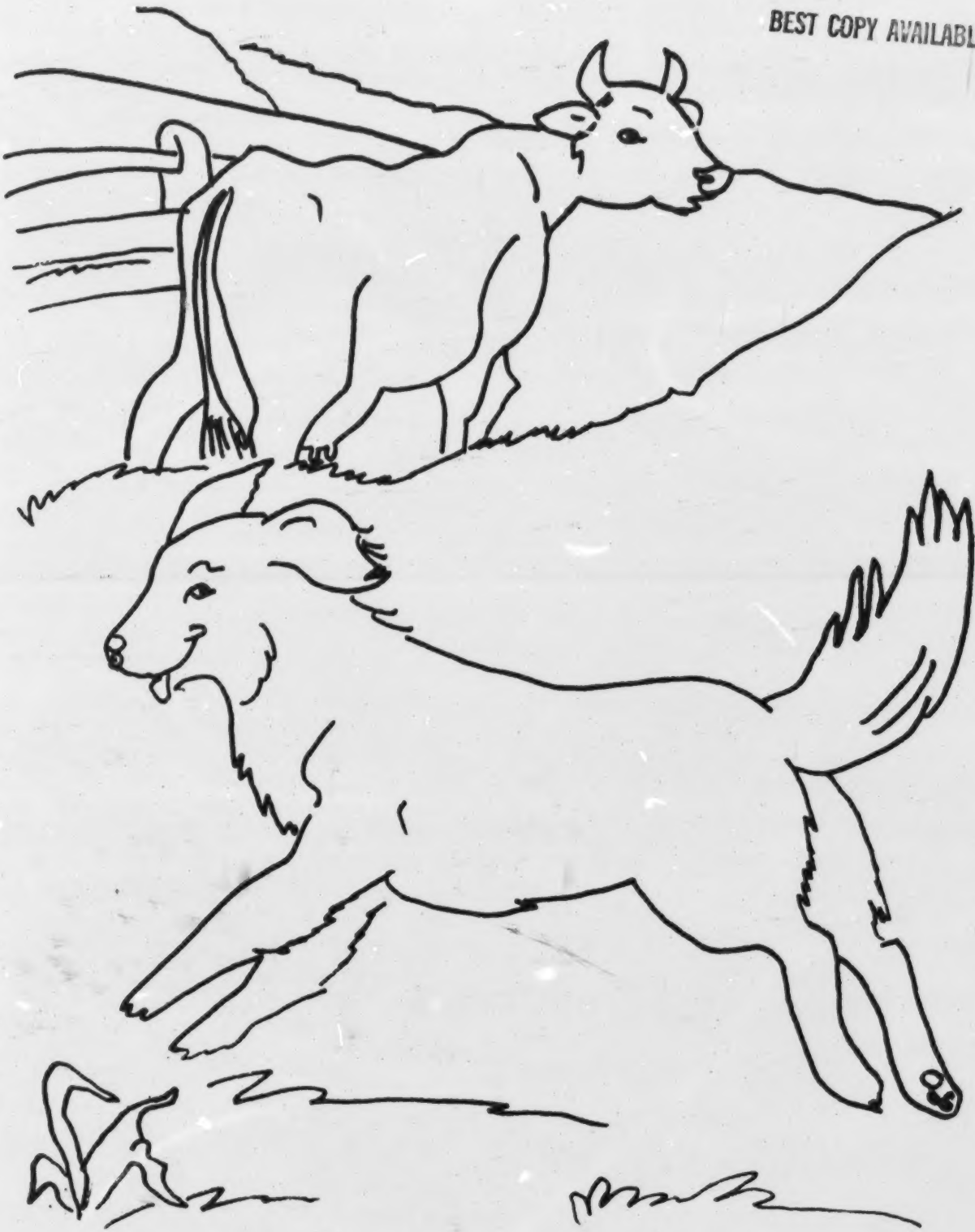
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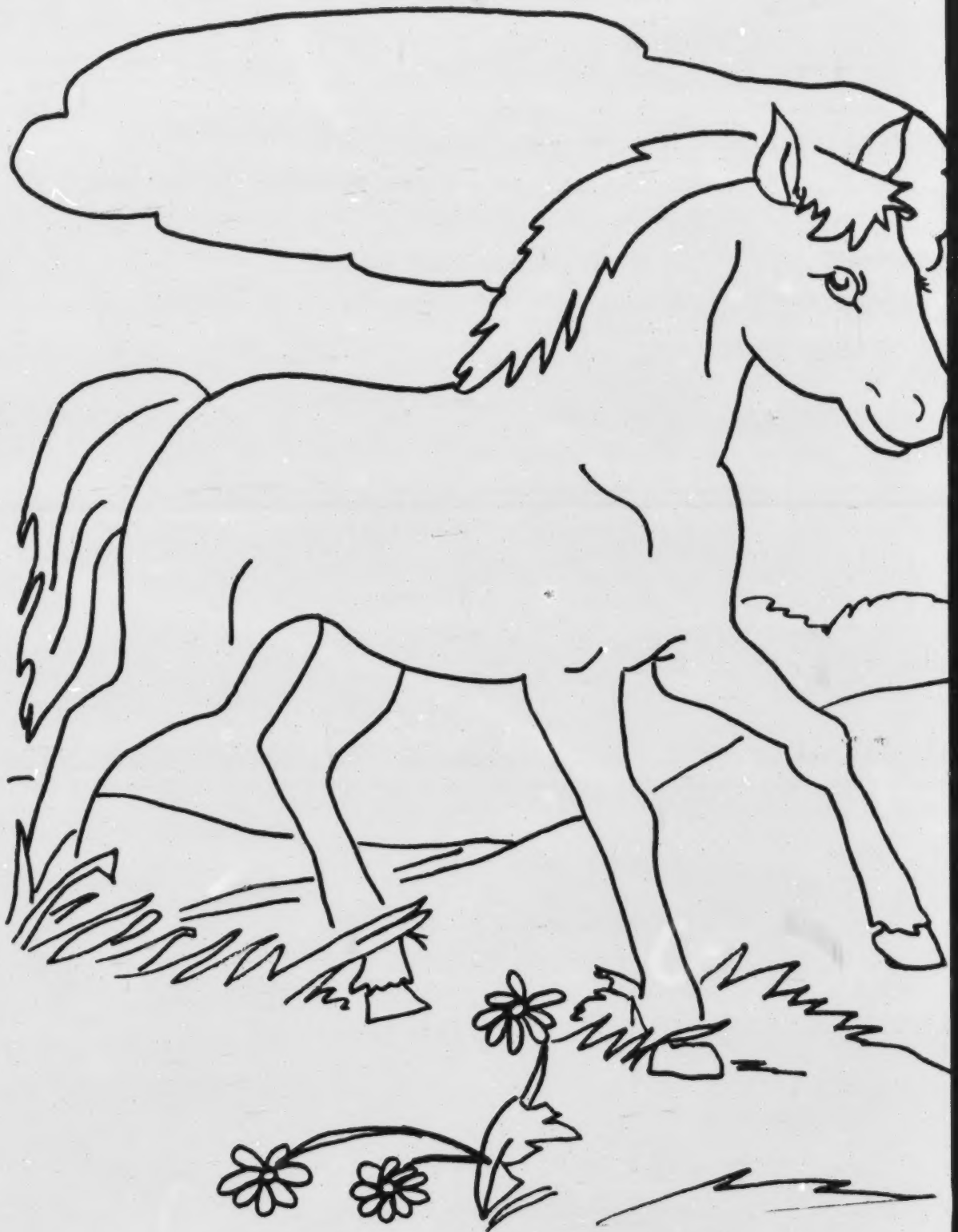
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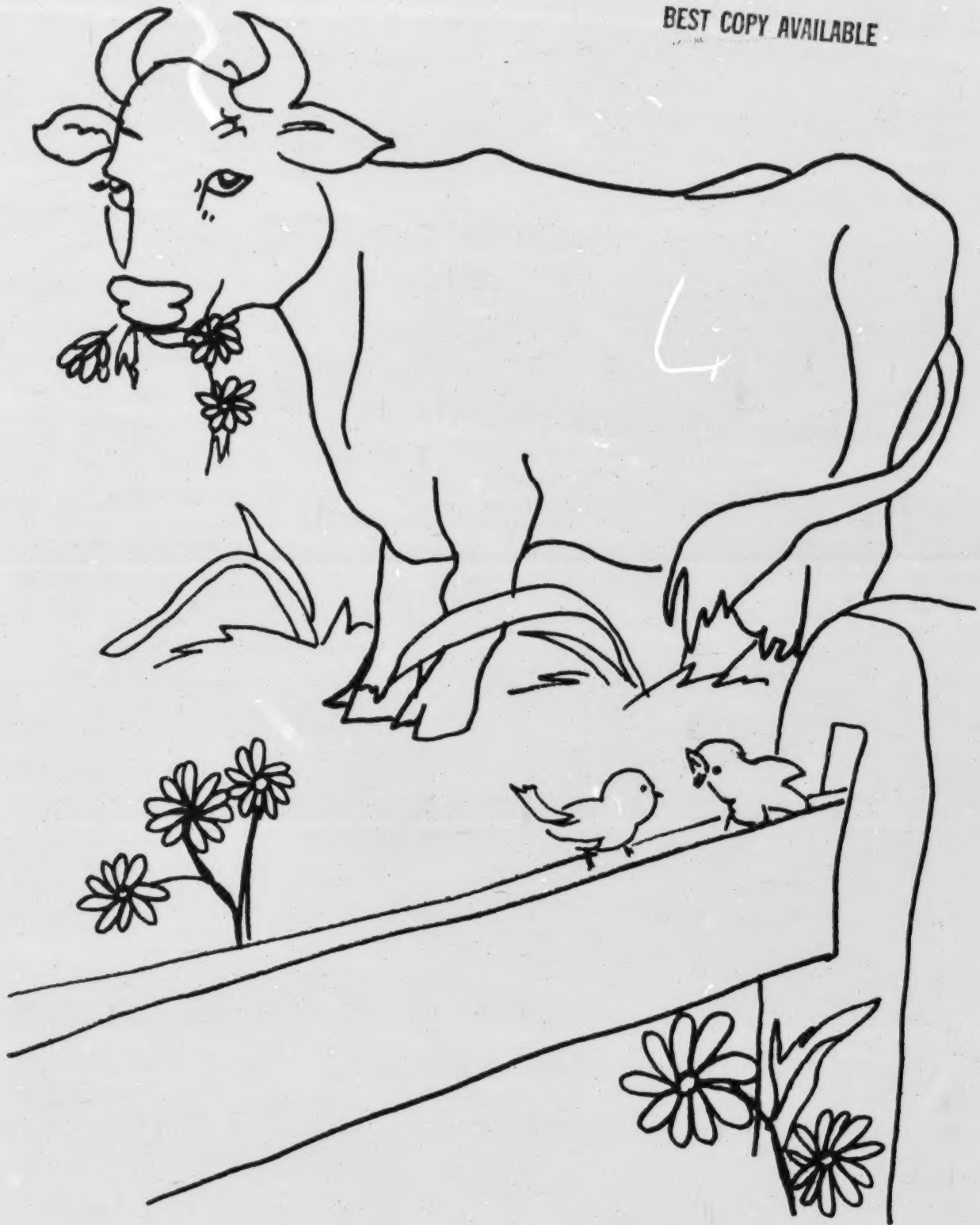
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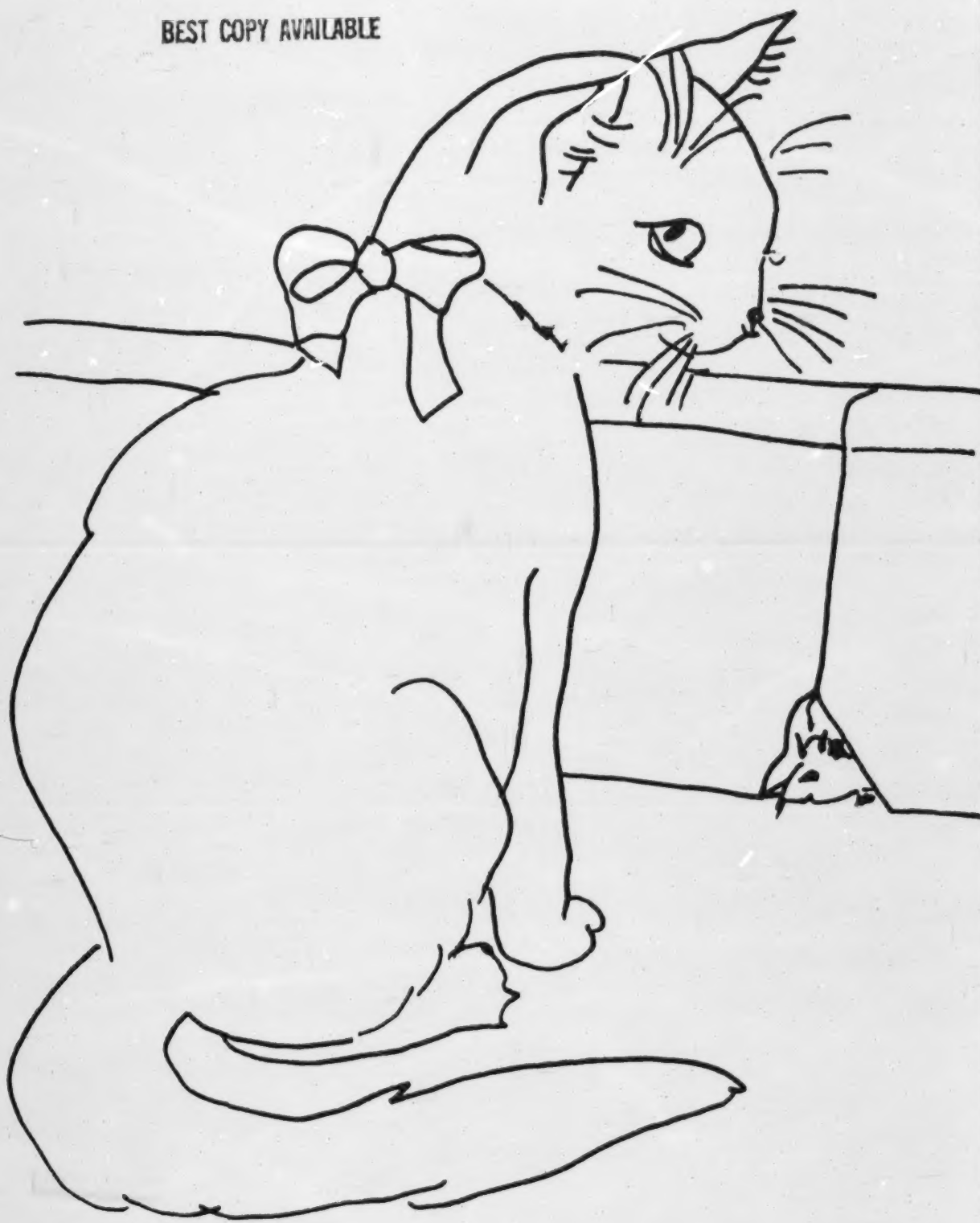
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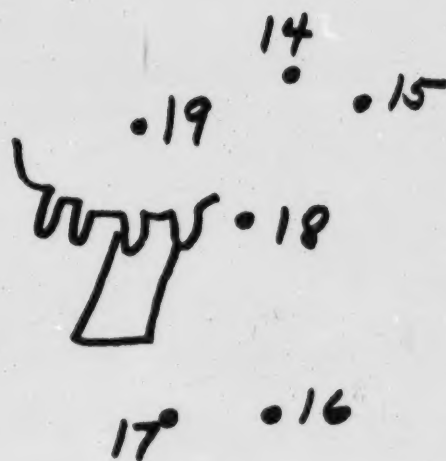
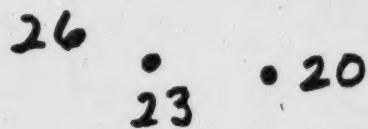
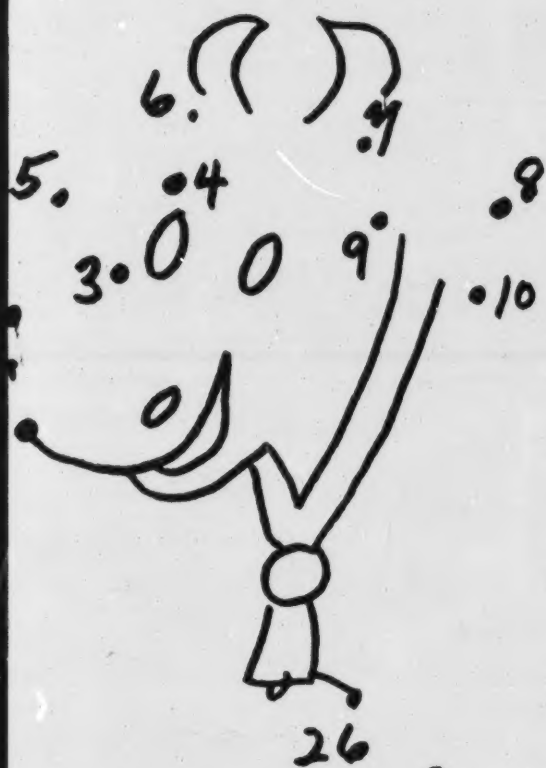
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Color the pictures of those things that you would find on a farm.

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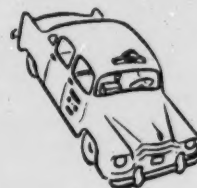
silo



ship



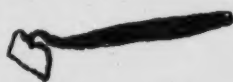
corn



taxi



drugstore



hoe



gas station



straw



fence



corn stalks



hydrant



goose



mailbox



haystack



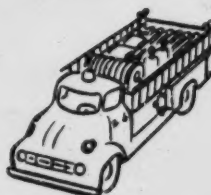
wheat grain



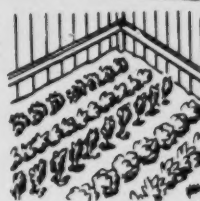
chick



hog pen



fire engine



garden



4 H emblem

Color the pictures of those things you would find on a farm. *BEST COPY AVAILABLE*



pig



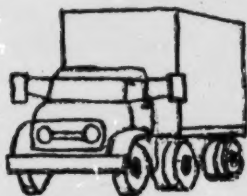
clown



library



rooster



truck



farmer



rocket



doctor



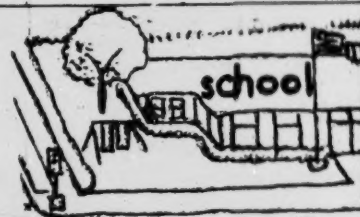
sheep



bus



turkey



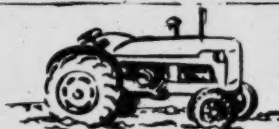
sidewalk



church



rake



tractor



colt



hen



jet



well



barn

Match mothers with their young by a line from one to the other.

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Diagram illustrating animal mothers and their young, connected by a dashed line:

- Left column (Mothers):
 - pig
 - horse
 - hen
 - cow
 - sheep
 - duck
- Right column (Young):
 - colt
 - chicks
 - piglet
 - lamb
 - duckling
 - calf

A dashed line connects the pig to the piglet.

Find a farm animal.



Find a farm animal.



Find a farm animal.



Find a farm animal.



Find a farm animal.



Find a farm animal.





The children are in a barn.

There is a hen in the barn.

The hen is sitting on a nest.

There are eggs in the nest.

Baby chicks will come from the eggs.

1. The children are in a _____.

nest eggs barn

2. The hen is sitting on a _____.

barn nest book

Worksheet

Types of Farms

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THE FARMER IN THE DELL

THE FARMER IN THE DELL

HI-HO THE DAIRY-O

THE FARMER IN THE DELL



FILL IN DOT TO DOT TO SEE WHAT KIND OF FARM THIS IS.

Little Seeds

Seeds are bur-ied deep, deep, deep: In the soil they

The first line of music is in 2/4 time, key of D major. The melody starts on D4, goes up to F#4, then down to E4, D4, C#4, B3, A3, G3. The bass line starts on G2, goes up to A2, B2, C3, D3, E3, F3, G3. There is a sharp sign above the 'deep, deep, deep' lyrics.

sleep, sleep sleep Yel-low sun-beams bright, bright, bright

The second line of music continues the melody. The melody starts on G3, goes up to A3, B3, C4, D4, E4, F#4, G4. The bass line starts on A2, goes up to B2, C3, D3, E3, F3, G3, A3. There is a sharp sign above the 'Yel-low' lyrics.

Rain-drops fall-ing light, light, light Gentle breez-es

The third line of music continues the melody. The melody starts on G4, goes up to A4, B4, C5, D5, E5, F#5, G5. The bass line starts on B2, goes up to C3, D3, E3, F3, G3, A3, B3. There is a sharp sign above the 'light, light, light' lyrics.

blow, blow, blow lit-tle seeds be-gin to grow

The fourth line of music continues the melody. The melody starts on G5, goes up to A5, B5, C6, D6, E6, F#6, G6. The bass line starts on C3, goes up to D3, E3, F3, G3, A3, B3, C4. There is a sharp sign above the 'blow, blow, blow' lyrics.

Copied from
unknown source

MUD

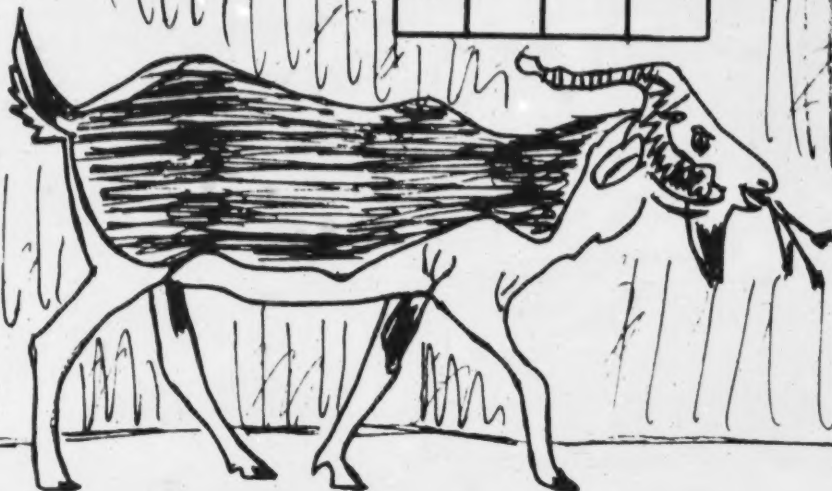
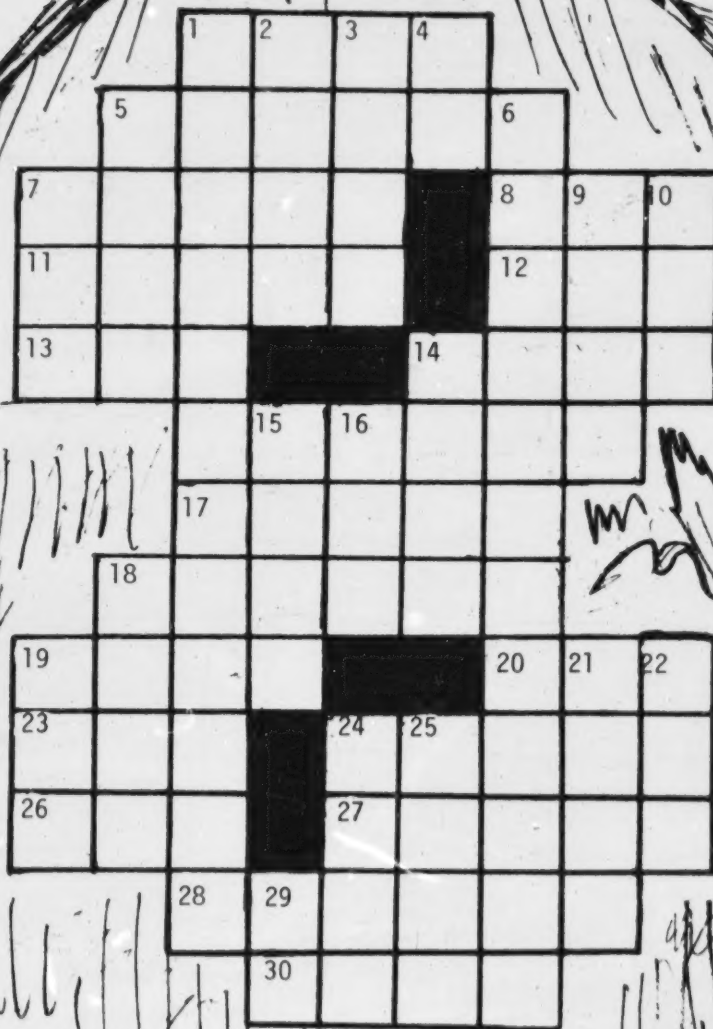
Mud is very nice to feel
All squishing out between the toes
I'd rather squish around in mud
Than smell a yellow rose
Nobody else but the rosebush knows
How nice mud feels between the toes.

THE FRIENDLY ROCK

There's a friendly rock down by the shore -
He's teaching me to swim -
I'm not afraid -
Not any more!
I just hold on to him!

FARM FROLIC CROSSWORD PUZZLE

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FARM FROLIC

ACROSS

1. small lake
5. bigger than streams
7. strong, stubborn work animals
8. cushion
11. wide-awake; watchful
12. to tell an untruth
13. bright color; crimson
14. building on a farm
15. gold-colored metal
17. land by the ocean
18. to rattle, like a heavy chain
19. farm animal with horns
20. large open container for bathing
23. to find the sum of numbers
24. to follow swiftly; to pursue
26. insect that makes honey
27. moved swiftly
28. dangerous ocean fish
30. to do as one is told

DOWN

1. put in stacks
2. above; higher than
3. bird's home
4. physician's title (abbreviation)
5. control; govern
6. cause water to fly about; splat
7. to blemish
9. makes known publicly
10. wild animal's home
14. opposite of front
15. to defeat, as in a game
16. moved swiftly
17. spears of grass; knife parts
18. secret writing
19. to talk idly; gossip (slang)
20. sticky, as paint or glue
21. gets the service from
22. flower plot
24. a shellfish
25. rabbit-like animal
29. exclamation of scorn or surprise

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ANSWER SHEET
TO FARM FROLIC PUZZLE

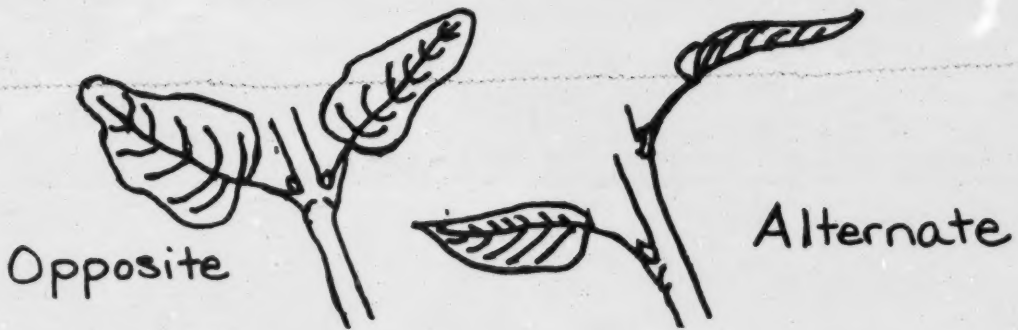


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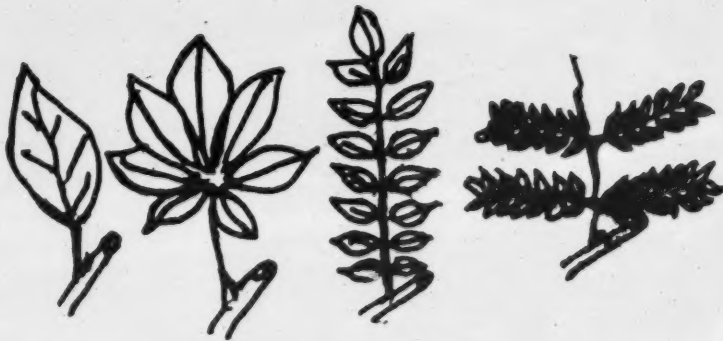


LEAF TYPES

Leaf Arrangement

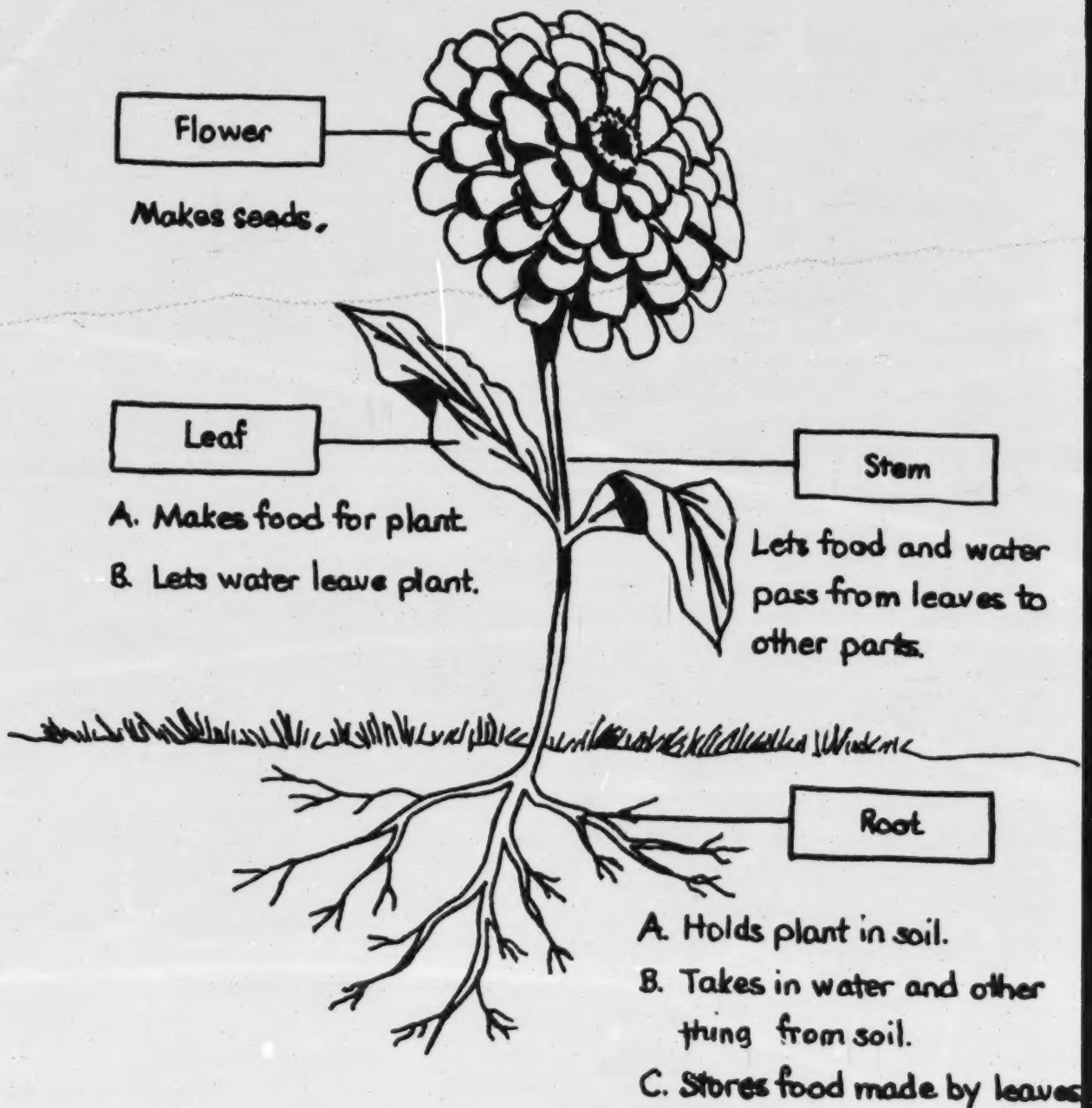


Leaf Composition



Simple Palmate Pinnate Double
 Compound Pinnate

PARTS OF PLANTS

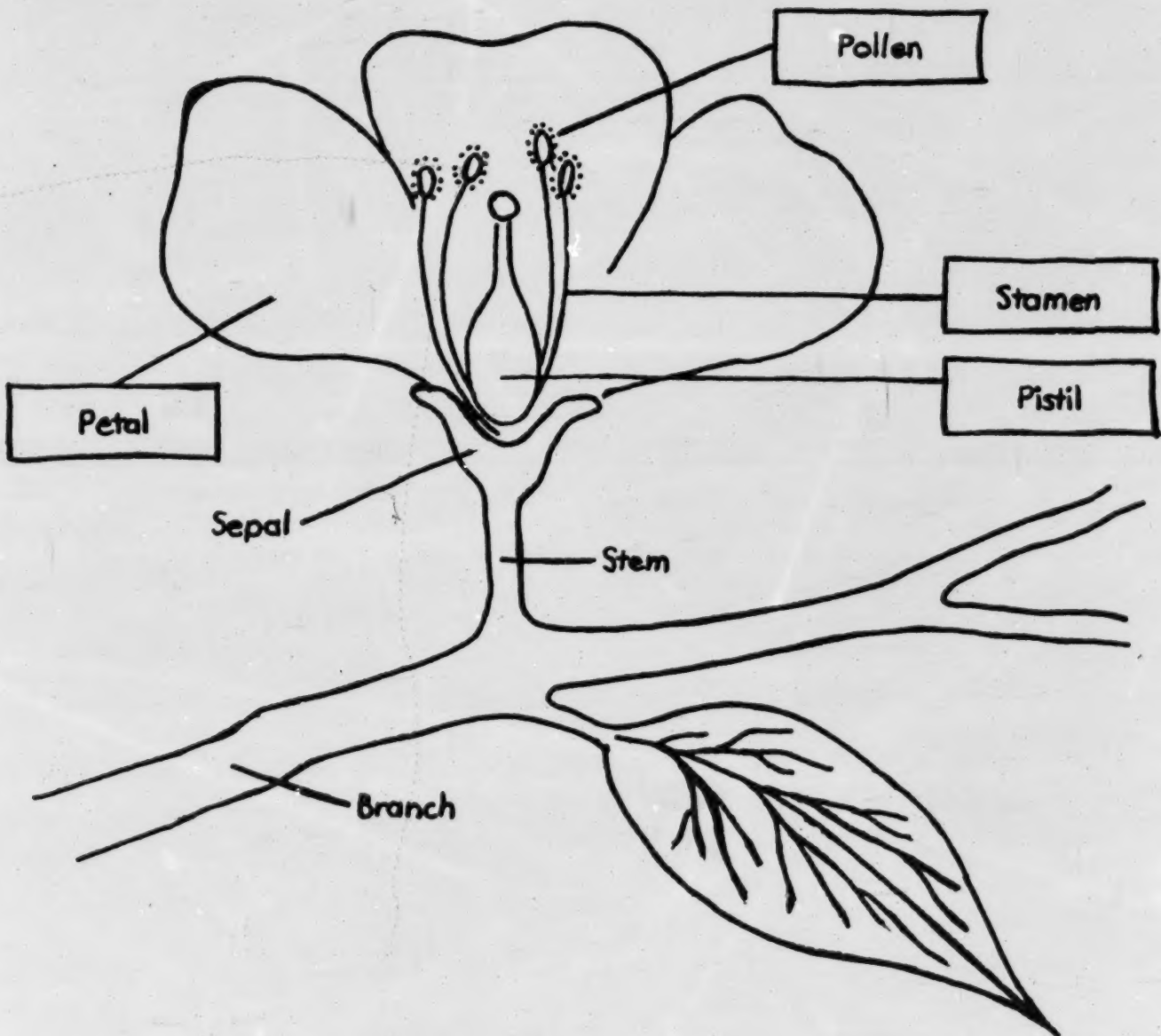


PUPIL ACTIVITIES

1. Circle the part of a plant that is under ground.
2. Draw a line under the part of a plant that lets air enter and leave the plant.
3. The part of the plant that makes seeds is called the _____.
4. Color each part of the plant.

PARTS OF A FLOWER

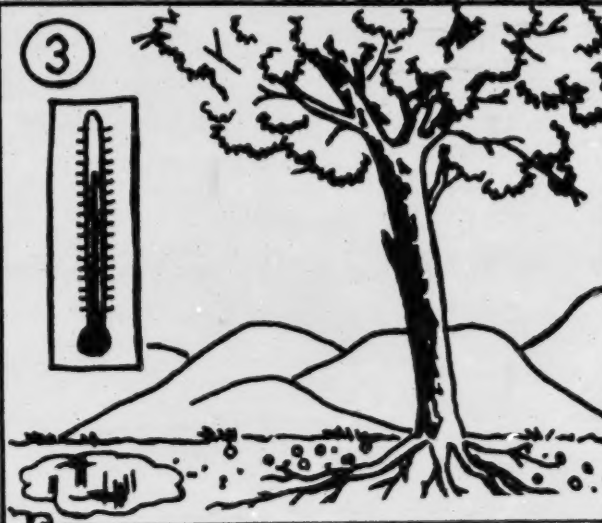
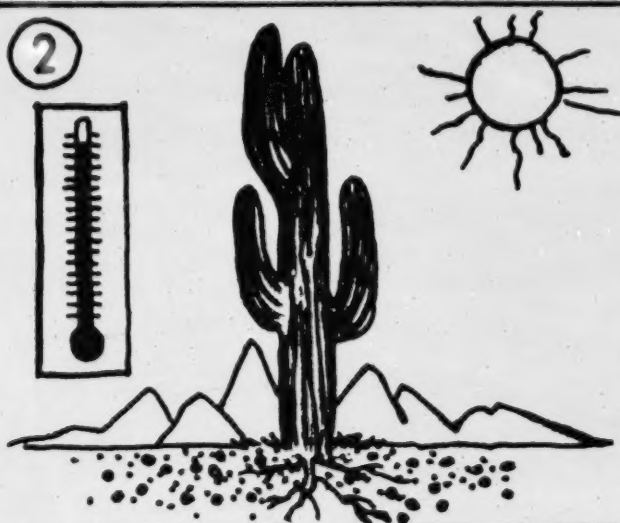
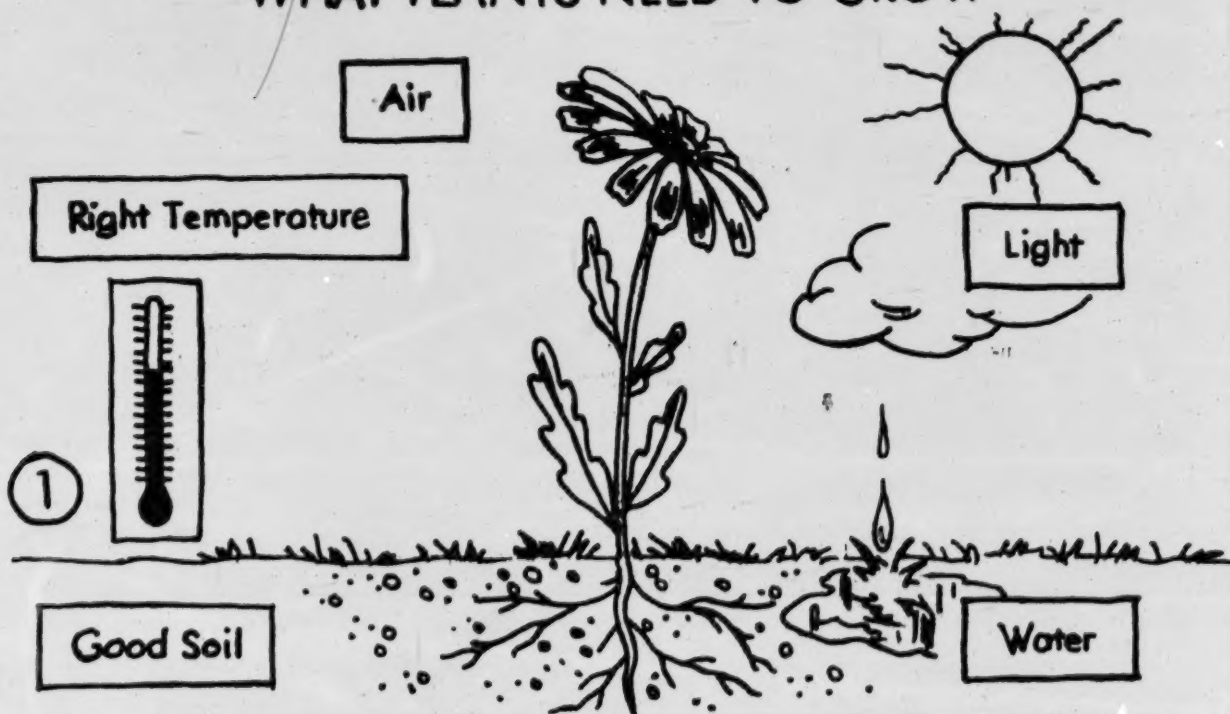
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PUPIL ACTIVITIES

1. Name the following parts of a flower:
 - A. The part of the flower that has pollen on its tip. _____.
 - B. The colored part of a flower that looks like a leaf. _____.
2. Circle the part of the plant that joins the flower to the branch.
3. Color each part of the flower a different color.

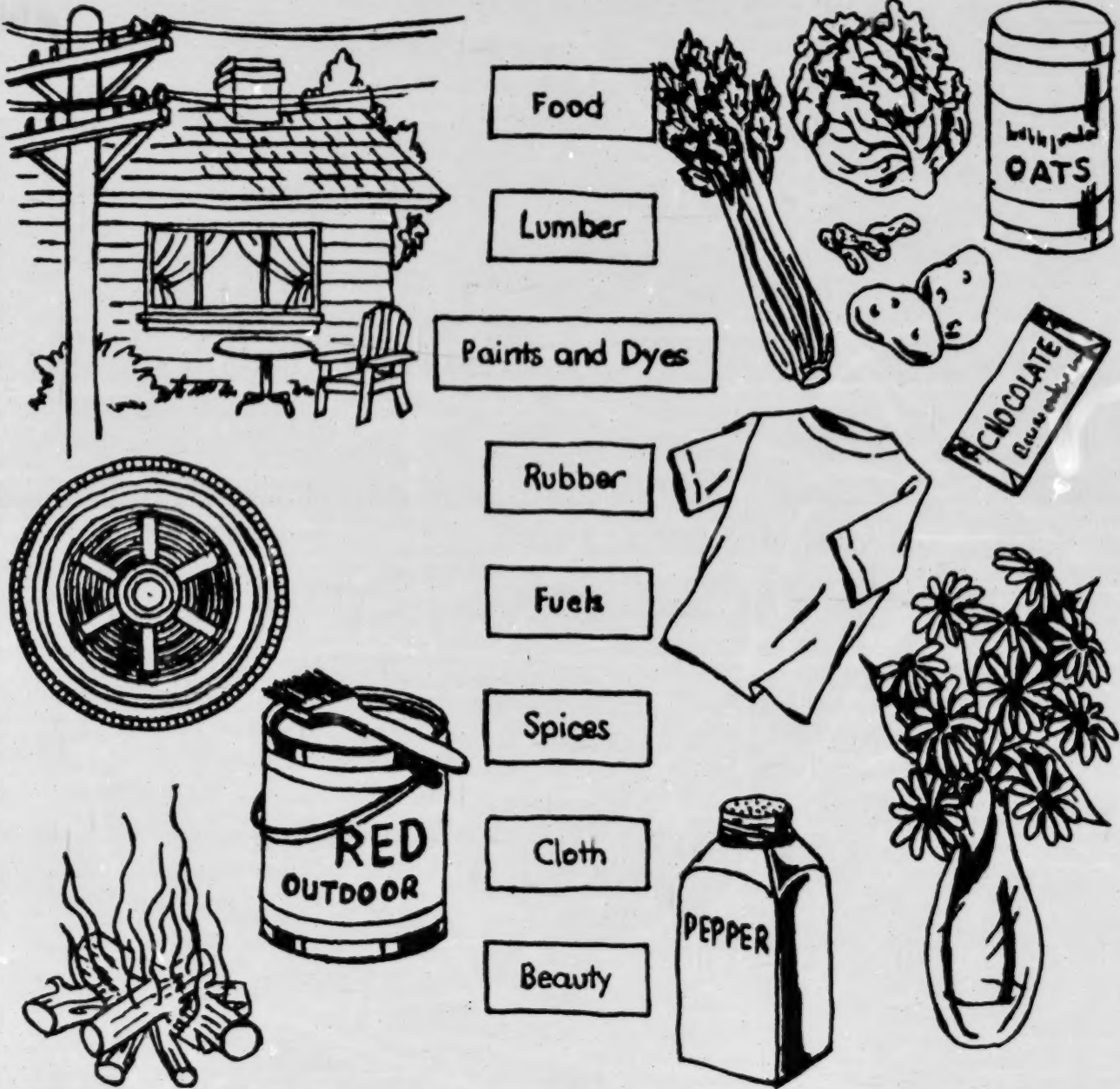
WHAT PLANTS NEED TO GROW



PUPIL ACTIVITIES

1. Put a blue line under the word that tells what is missing in picture 2, and a red line for picture 3. Air, water, good soil, temperature, light.
2. Draw the missing thing in each picture.
3. Circle the plant you would see in a desert.
4. The sun is one way a plant can get light. Circle your answer: yes no
5. Color each plant.

WHAT WE GET FROM PLANTS



PUPIL ACTIVITIES

1. Show what we get from plants by drawing a line from the word to the picture of the plant which provides the given product.
2. Circle in red the picture that shows something we wear.
3. Circle in blue the picture that is part of a car.
4. Color all the things we get from plants.

HOW SEEDS TRAVEL



Dandelion

Maple



Milkweed

Carried by wind



Cocklebur



Beggar-tick



Acorn

Carried by animals and man



Seeds

Water Lily



Palm

Coconuts (seeds)

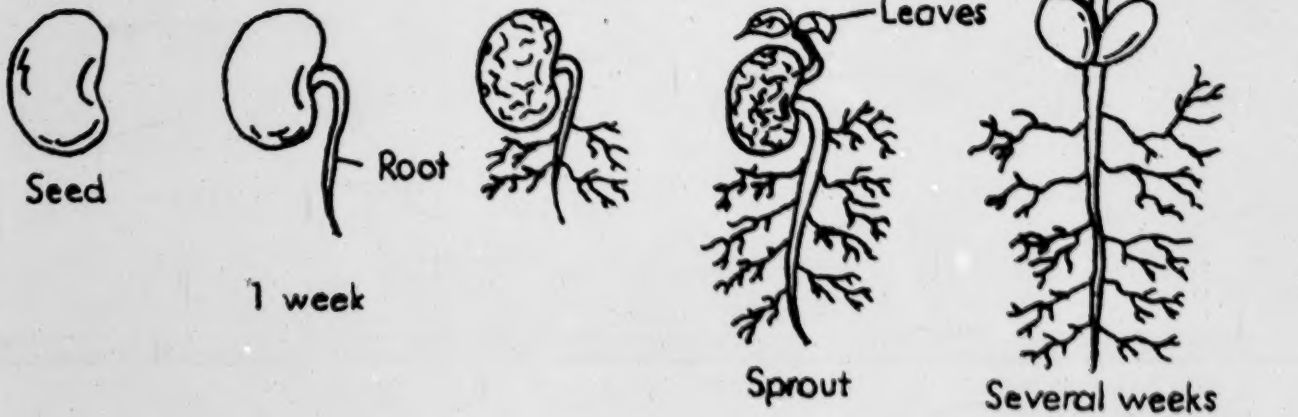
Carried by water

PUPIL ACTIVITIES

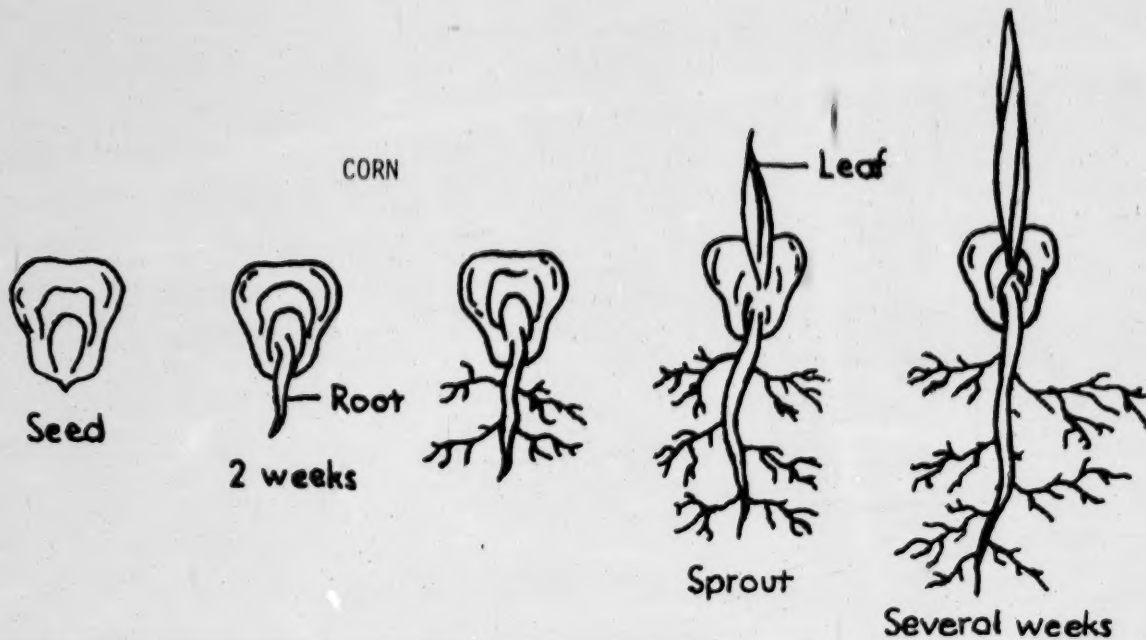
1. Circle the seeds that might stick to your sweater.
2. Draw a line under the seeds that have wings.
3. Name one kind of plant with seeds that float on water. _____
4. Color the seeds that you have seen.

PLANT GROWTH AND CHANGE

LIMA BEAN

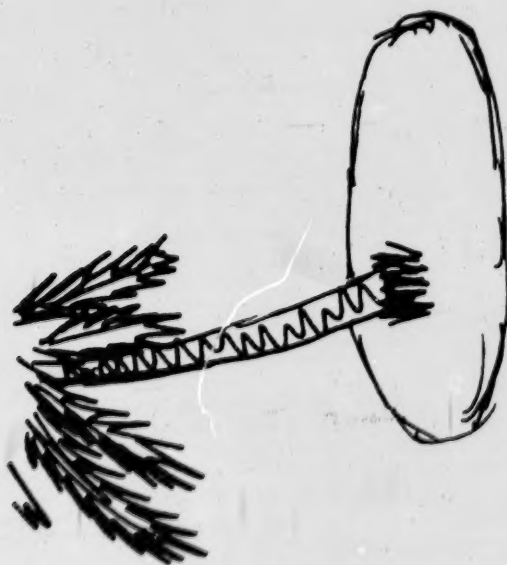
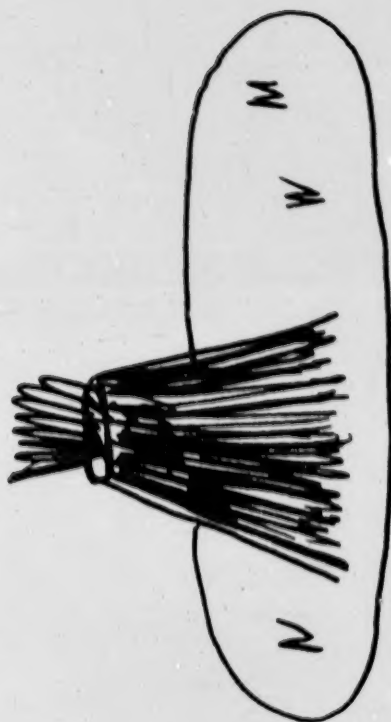


CORN

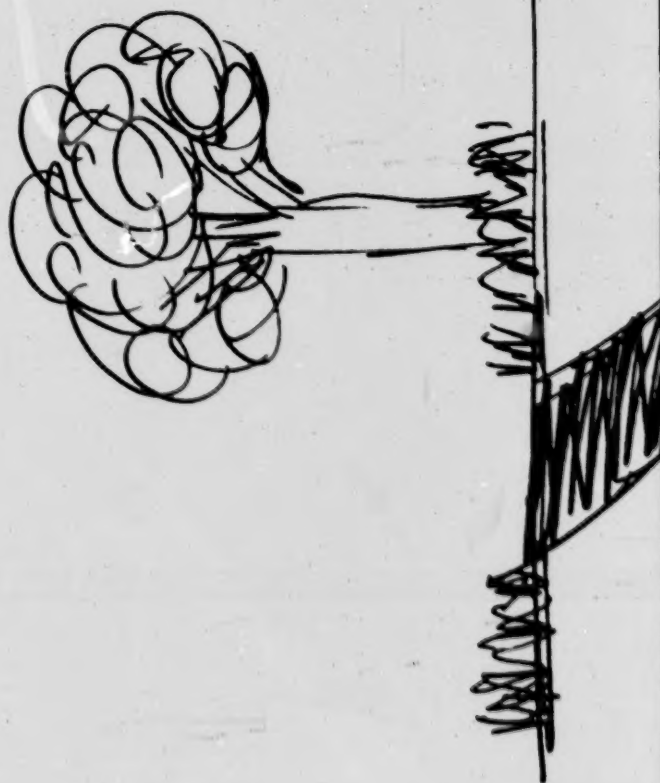
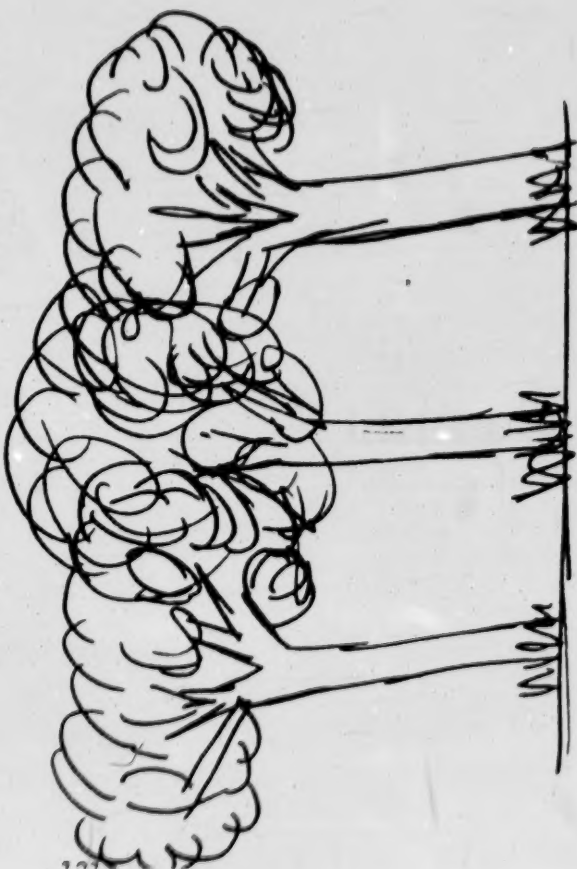


PUPIL ACTIVITIES

1. Circle the pictures where the root is first seen.
2. Draw a line under the pictures where the leaves are first seen.
3. The part of the plant that takes water from the soil is called the _____.
4. Color the seeds and the young plants.

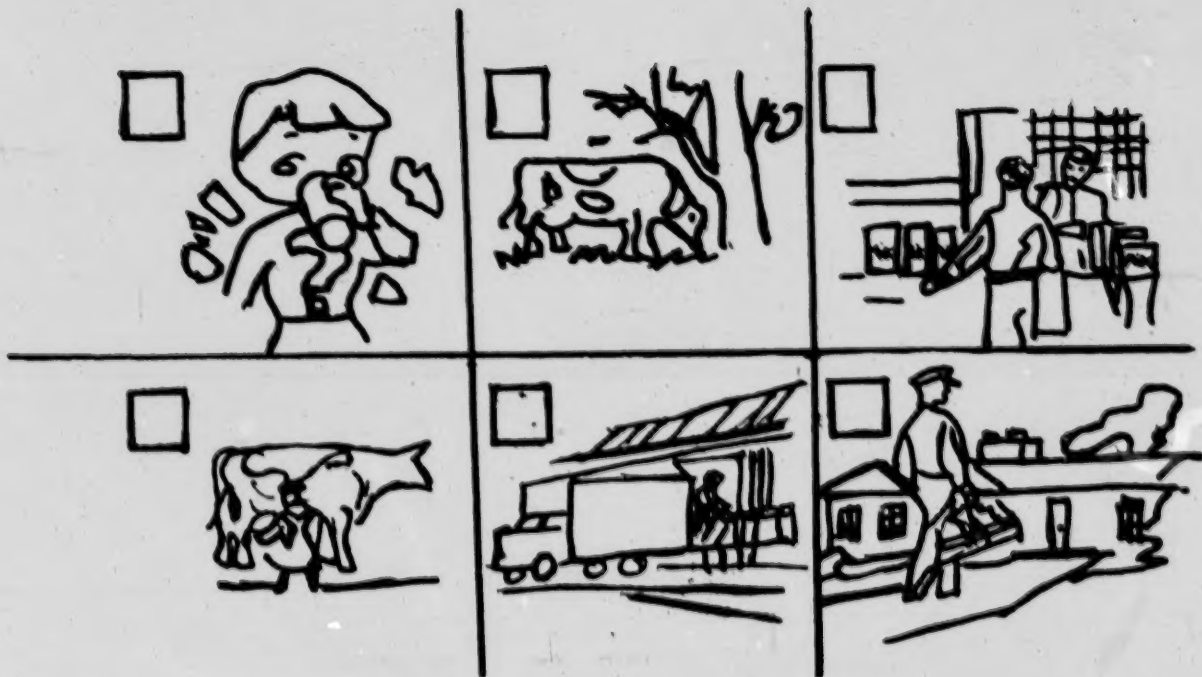


WHERE WOULD
YOU RAISE CATTLE?



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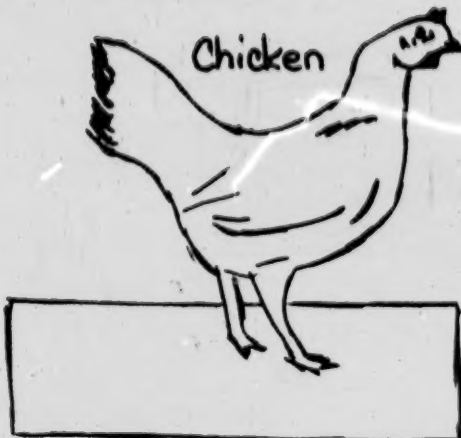
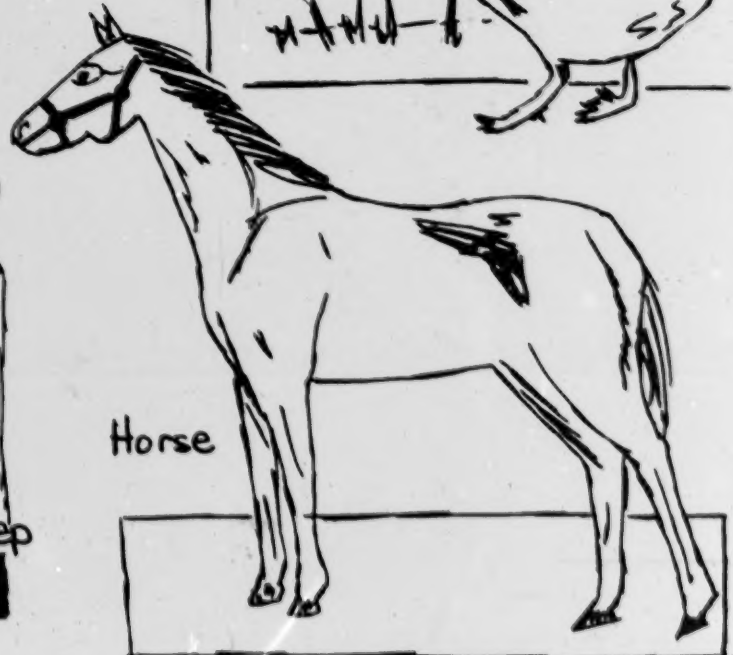
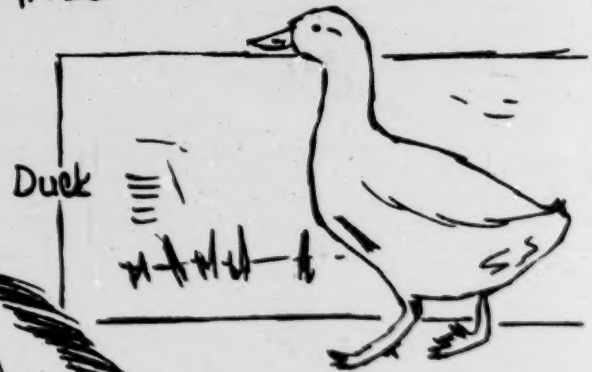
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THE STORY OF MILK

Put the pictures in order by numbering them.

FARM ANIMALS



PUPIL ACTIVITIES

1. Draw a line under the animal that gives us wool.
2. Circle the animal that is often used to pull wagons.
3. Put an X by the animal that likes to swim in water.
4. Color the animals that eat grass.

Draw a line from the beginning of the sentence to the correct ending.

A barn is

found under water.
made of straw.
a building for animals and storage.

A pig is

a house.
green.
an animal.

The milk we drink comes from

a pig.
a cow.
a horse.

A dozen eggs is

4 eggs.
10 eggs.
12 eggs.

Ham comes from

a horse.
a chicken.
a pig.

A silo is

a pigpen.
a building for storage of food.
a water trough.

A quart is more than

a gallon.
a half gallon.
a pint.

Dairy cows are sometimes

green.
purple.
brown.

Circle the animals called "livestock" which are raised by farmers for food.



kangaroo



zebra



pig



dinosaur

cow



duck



lion

dolphin



giraffe

turkey

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Some farms specialize in animal production and some in plant production.

1.

Match the animal or product to the specialized farms from which it comes.

sheep	dairy
chicken	ranch
hog	nursery
duck	ranch
horse	poultry
cattle	pen
turkey	pond
tree	poultry
cow	ranch
flower	fur
mink	floriculture

2.

Match the groceries bought at the supermarket to the specialized farm from which they come.

sugar	poultry
eggs	plantation
vegetables	truck
oranges	fruit
cheese	dairy
corn flakes	wheat
butter	oat
Cherrios	dairy
milk	plantation
bread	plantation
rice	corn
coffee	dairy

Define these words in a complete sentence. You may use your dictionaries.

chore -

plantation -

crops -

livestock -

silo -

4-H Club -

alfalfa -

market -

agriculture -

climate -

poultry -

corncrib -

cultivator -

fertilizer -

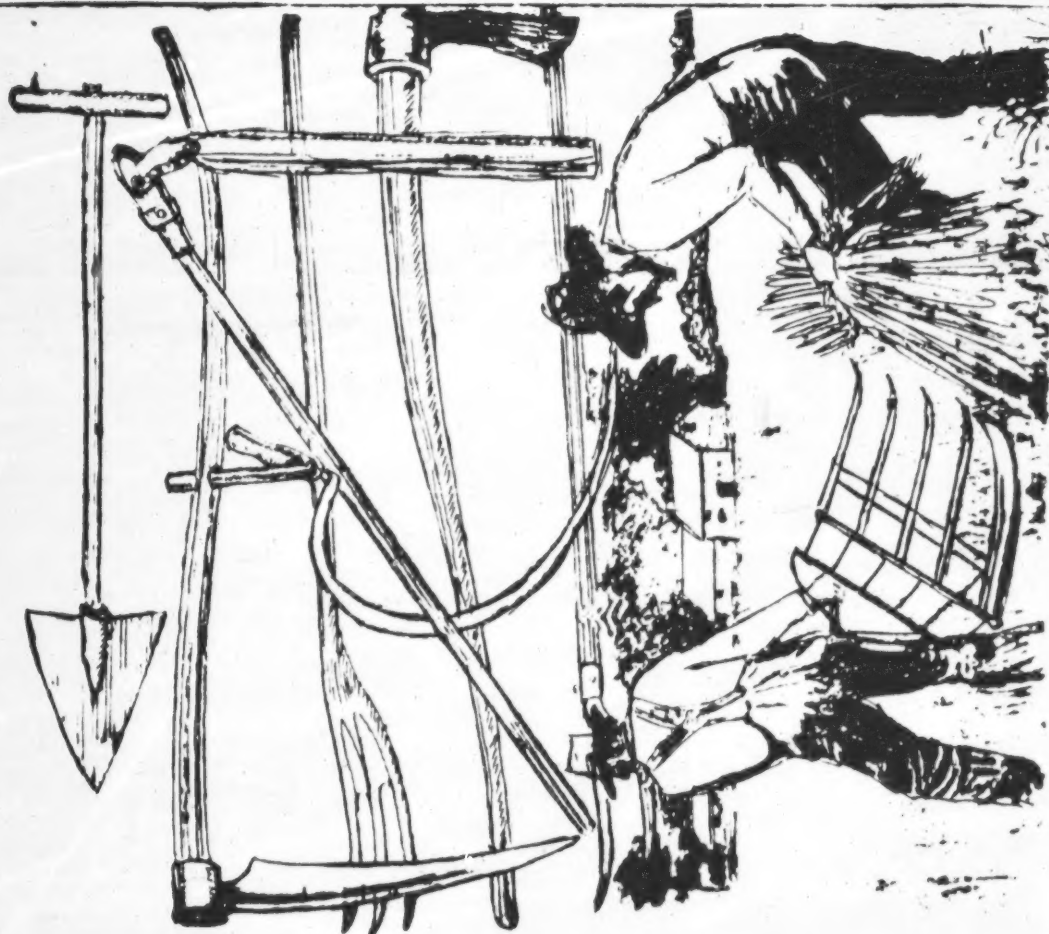
environment -

diversified farm -

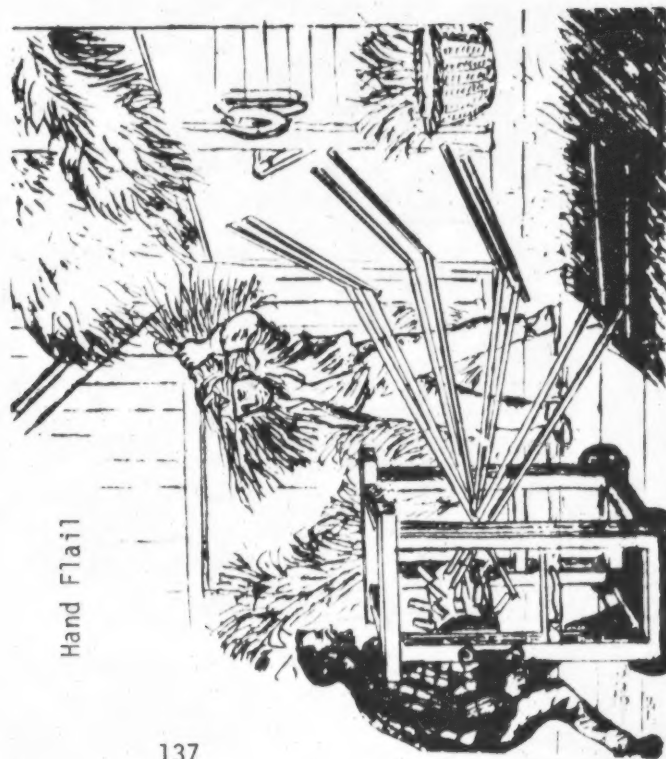
specialized farm -

sharecropper -

EARLY FARM TOOLS

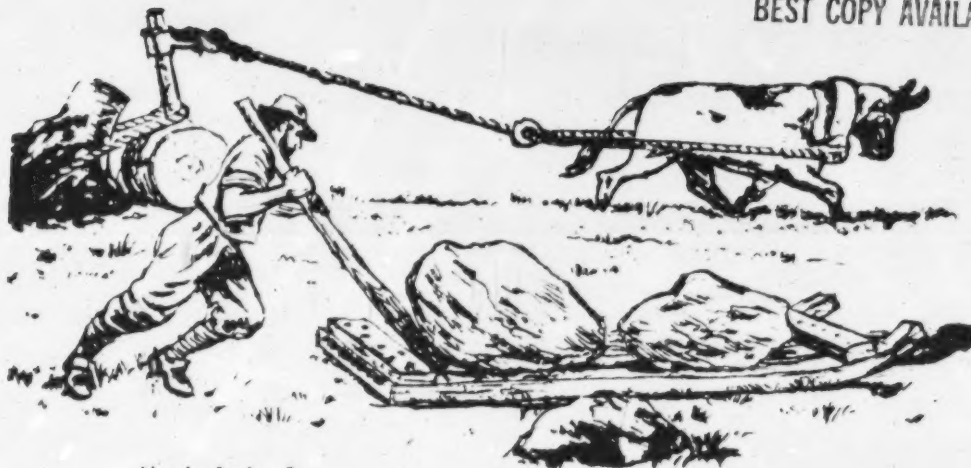


The Flail

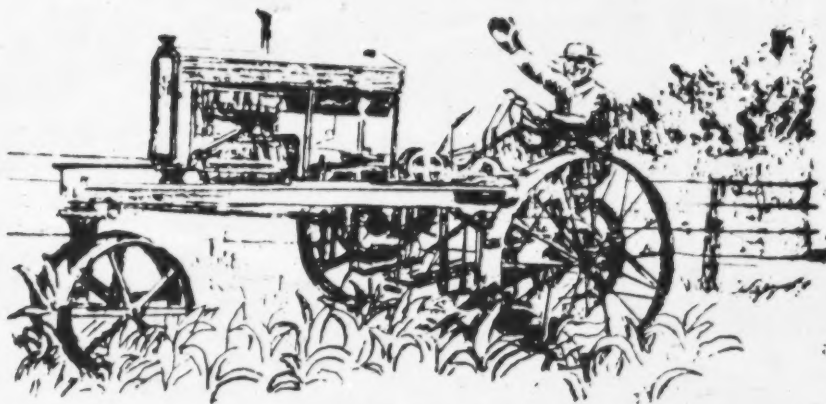


Hand Flail

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Work Animal

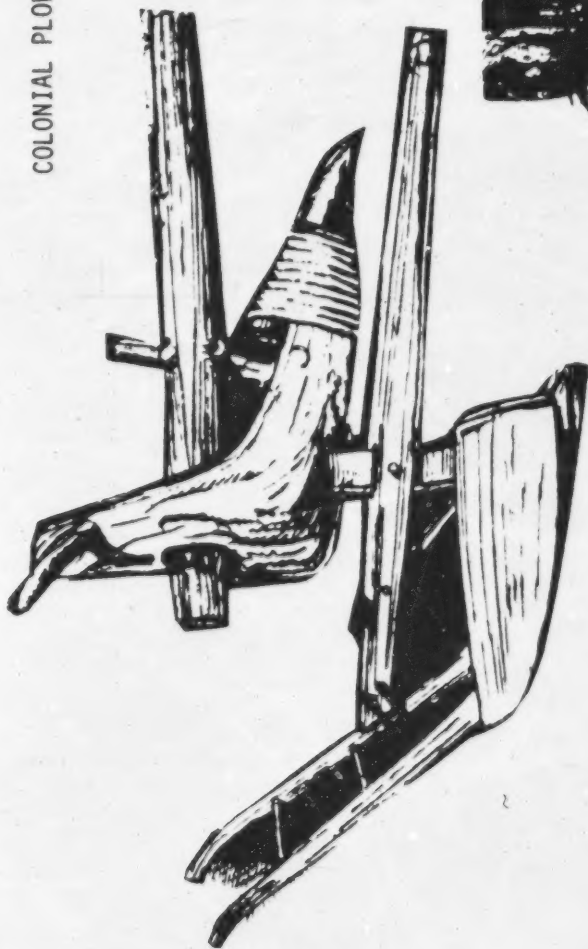


Early gasoline-powered tractor

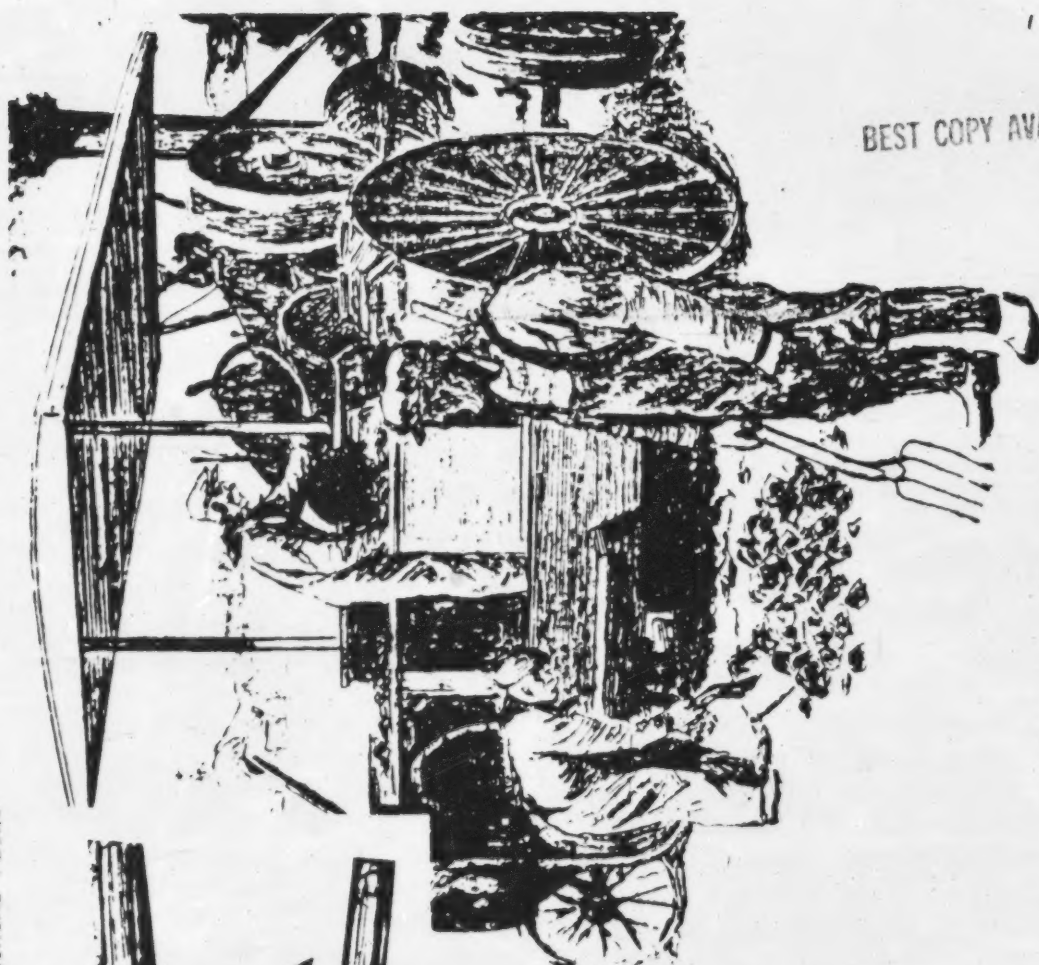


Corn picker

COLONIAL PLOWS



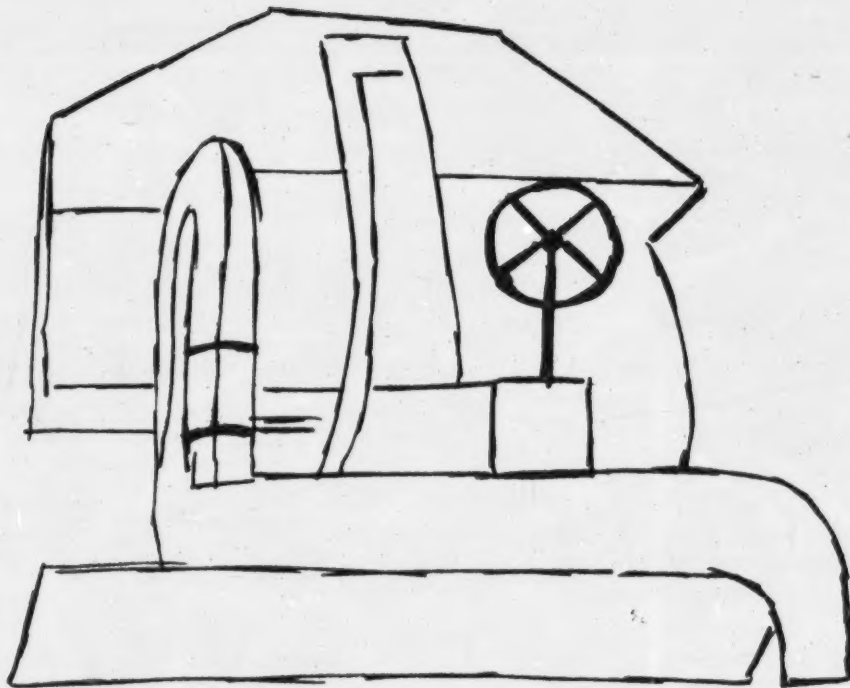
Old-fashioned plow



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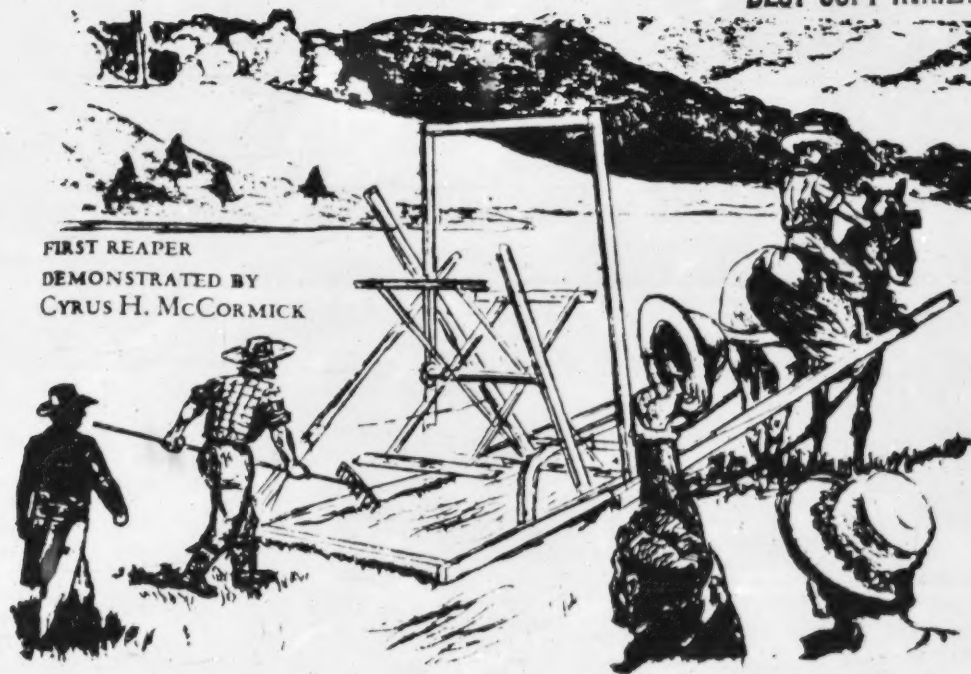
Steam traction engine

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pickers

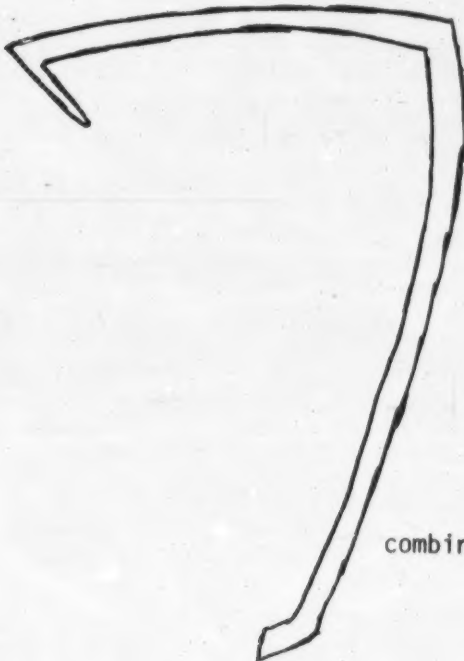
Picking the bolls of ripe cotton by hand used to be a slow, heartbreaking job that lasted from September through January. Digging potatoes and sugar beets, harvesting peas and cranberries, and picking fruit and nuts were other harvest tasks that involved many problems and risks. Now intricate machines, each especially designed for one kind of crop, can do such things as pick cotton, dig potatoes, scoop cranberries or blueberries neatly off their stems, gently pick peaches and apples, or harvest and shuck nuts.



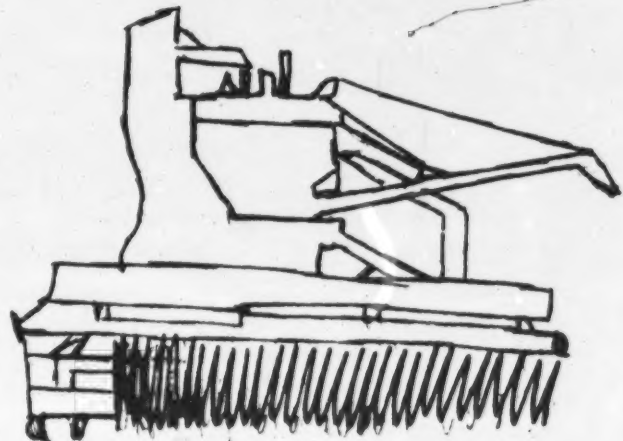
FIRST REAPER
DEMONSTRATED BY
CYRUS H. McCORMICK

Scythe

This instrument for cutting hay and ripe grain was invented by a Puritan blacksmith in Massachusetts about 1650. Its blade was forged from wrought iron and could be sharpened with a whetstone.



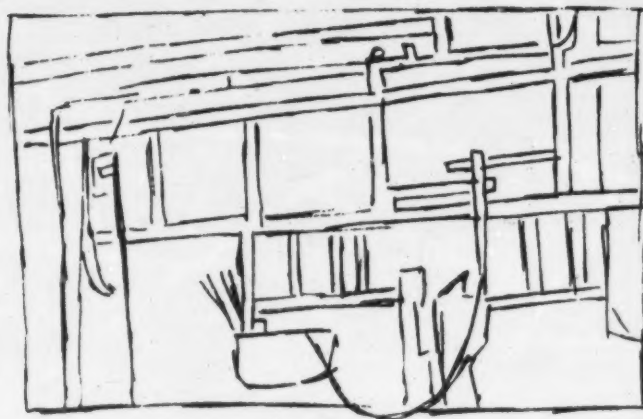
combine



This machine does the job that the scythe, flail and pitchfork once did, but much more rapidly. The combine cuts the ripe grain, threshes out the kernels and bags them, and bales the straw. Or, if the farmer wishes, the combine will shred the grain stalks into slivers that can be put back into the soil.

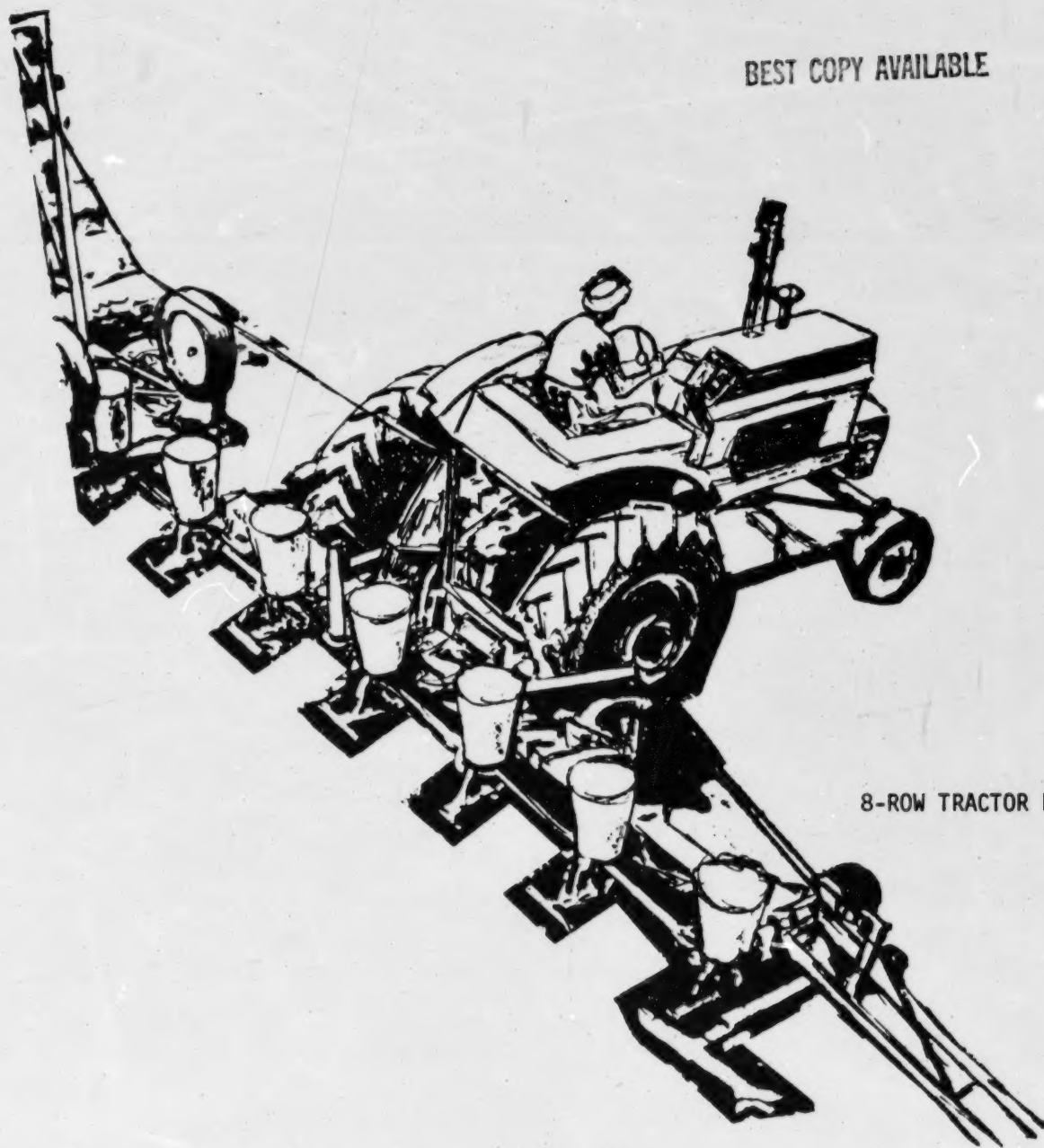


Cow being milked by hand.



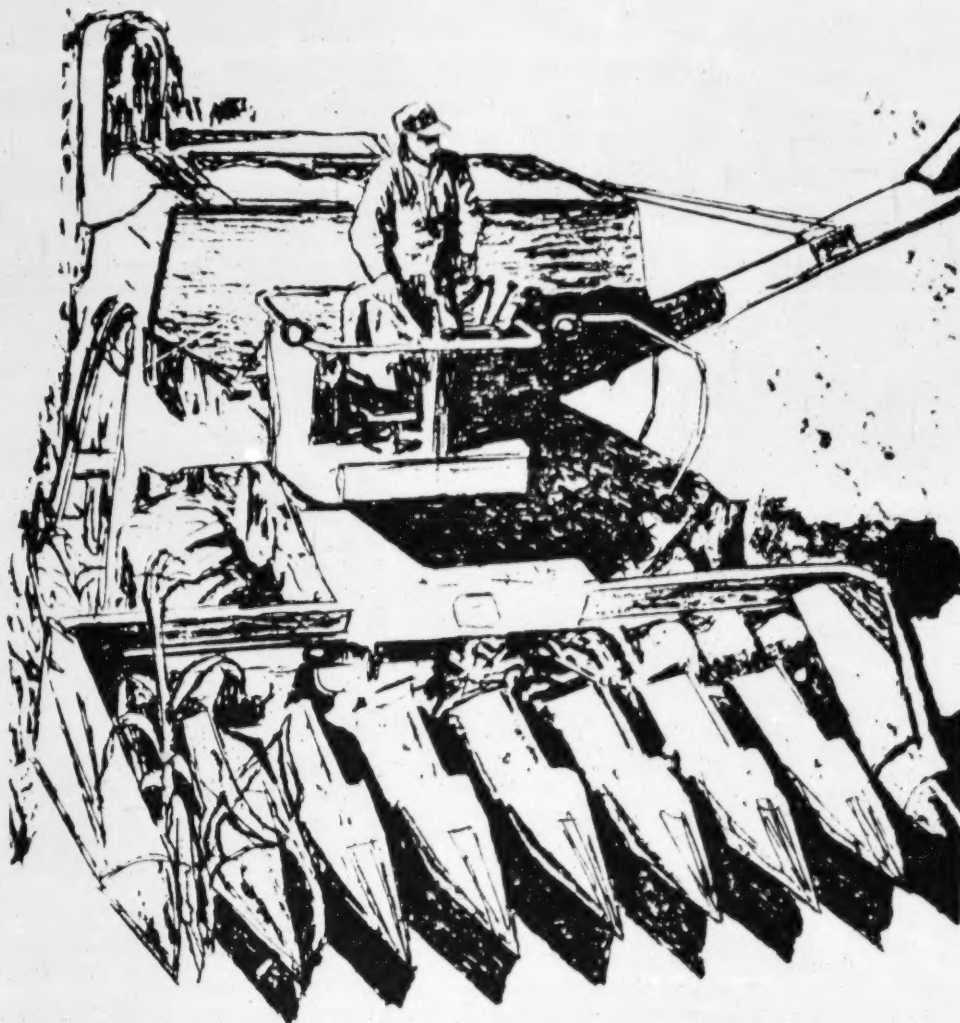
Modern Cow Parlor

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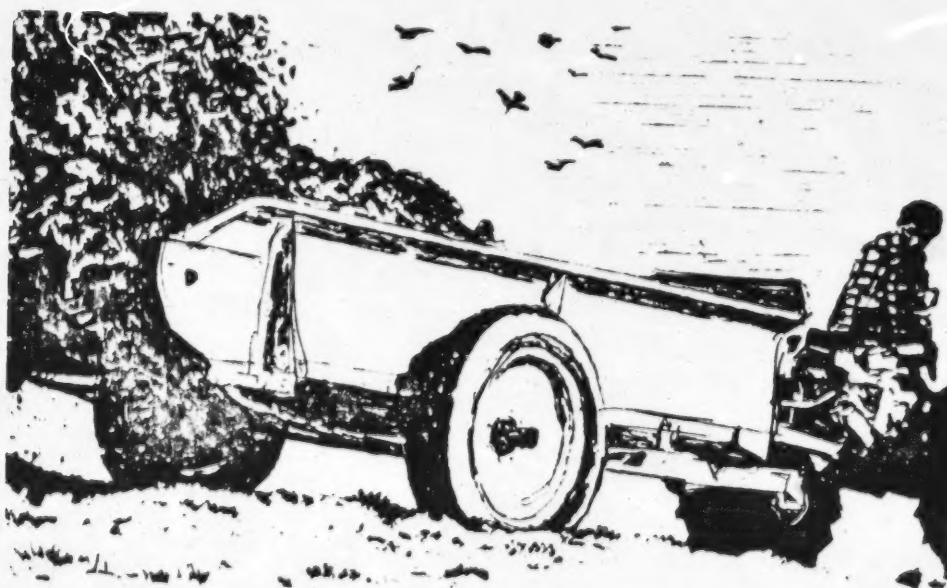


8-ROW TRACTOR PLANTER

MODERN FARM MACHINERY



Multiple-Row Corn Picker and Sheller



Manure Spreader

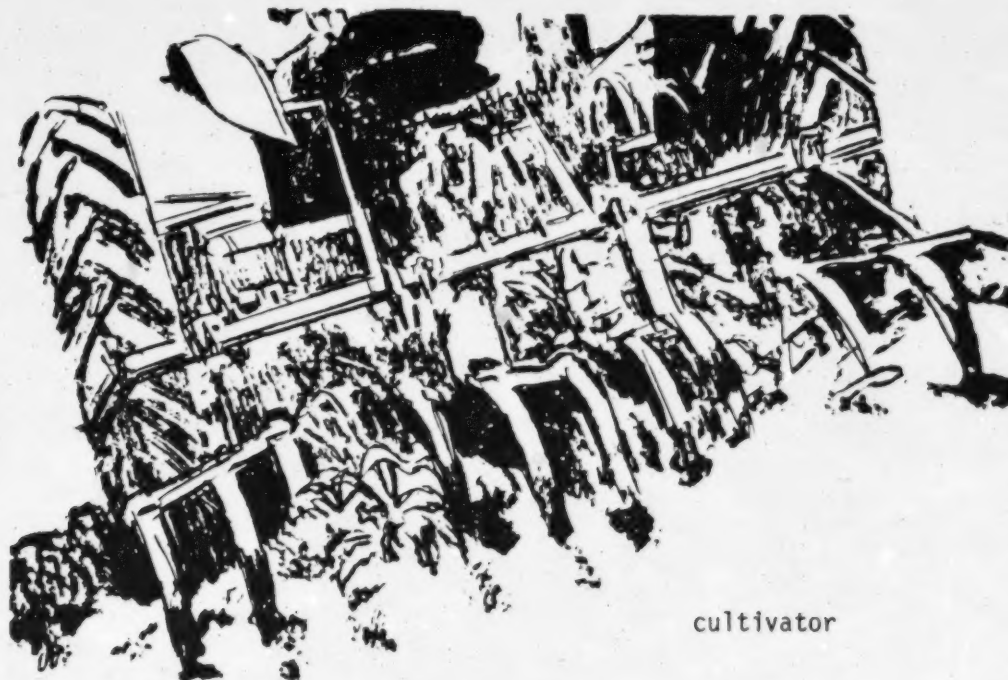


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disc
harrow

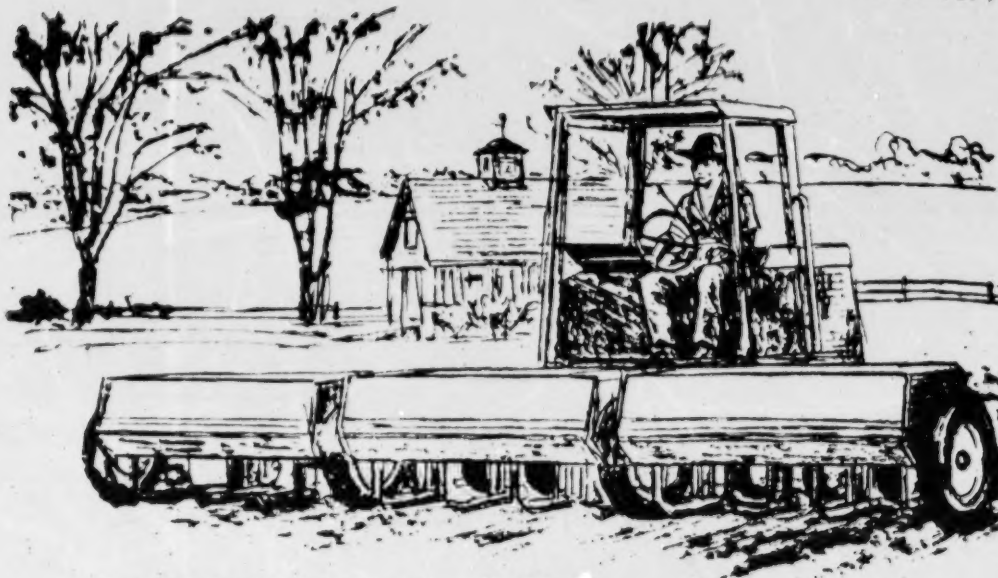
The furrows of earth that a plow digs all across a field must be broken into small pieces and leveled so that crop seeds can grow quickly into plants. The harrow used to be an iron frame with scores of iron teeth suspended from it. Dragged across a plowed field, the harrow broke up and leveled clods left by the plow.

A modern disc harrow is a row of sharp metal discs - ten to eighteen inches high - suspended in a metal frame five to ten feet long. When the disc harrow is pulled forward, the discs revolve and chop up the dirt clumps. If the soil is a good loam and not too muddy, a disc harrow will plow and harrow at the same time.

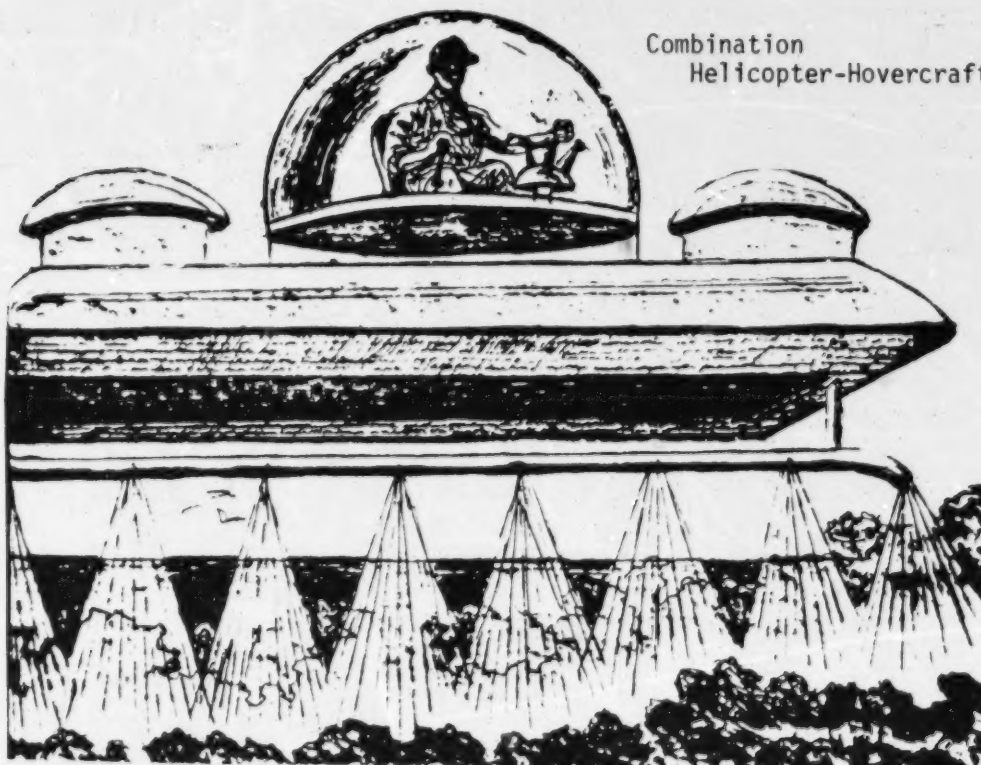


cultivator

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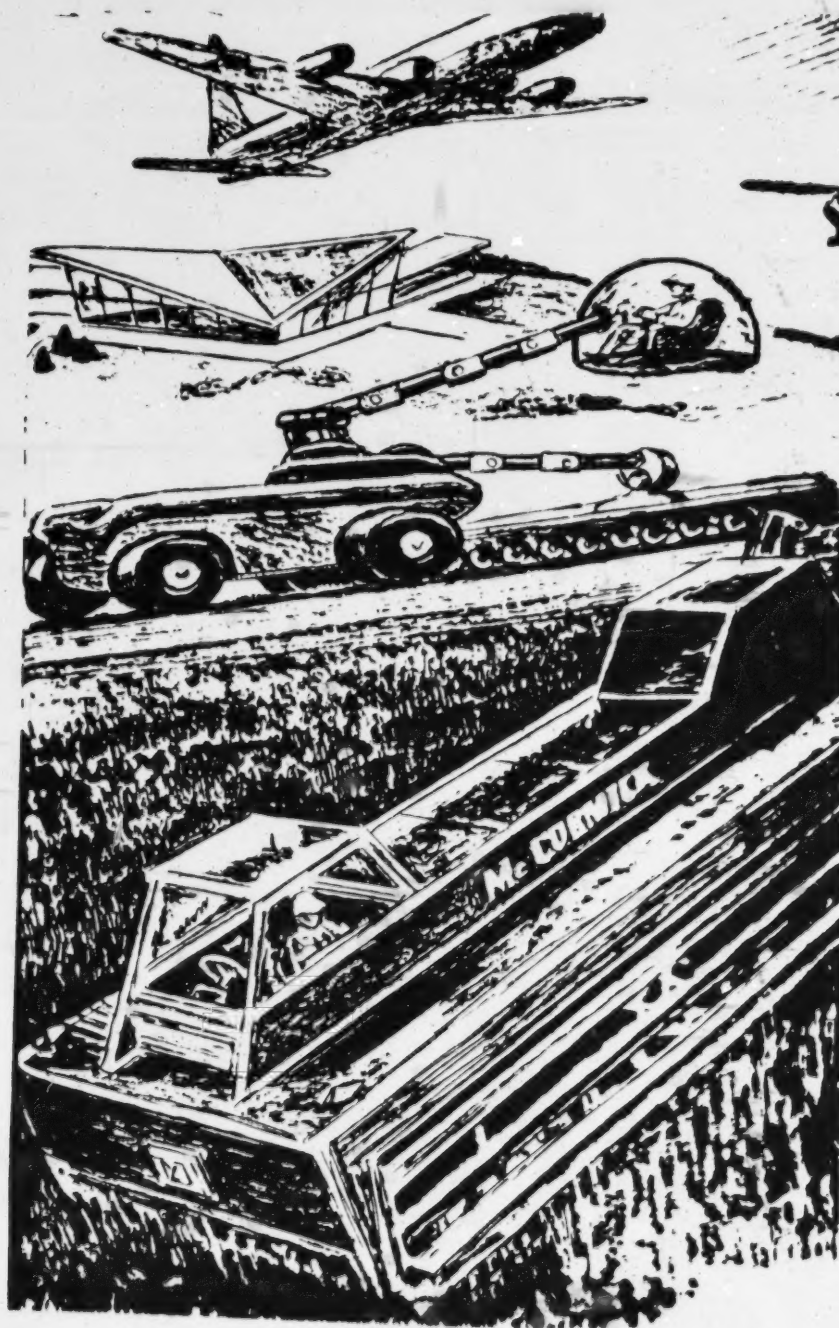
Self-Propelled Planting Machine



Combination
Helicopter-Hovercraft

FARM MACHINERY OF THE FUTURE

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BEEF AND DAIRY CATTLE

"There are three main kinds of cattle: those best for the production of beef, those used for dairy farming, and those that serve a dual purpose - milk cows, the calves of which can be sold for beef. Aberdeen-Angus and Herefords, among others, are beef cattle; while Jerseys and Guernseys are two of the best known dairy breeds. Devon, Red Polled, and Milking Shorthorns are all dual-purpose cattle. Then, too, there are different degrees of cattle, ranging from the lowly scrubs through the grades to the beautiful registered thoroughbreds.

Scrubs are nondescript cattle of unknown parentage. Grade cattle have one parent either scrub or grade, and the other from a registered breed. Any herd can be improved, or upgraded, as the proportion of thoroughbred parentage of each animal is increased.

But upgraded cattle can never be registered, for all registered cattle have a long family record, and must have two parents already registered with a cattle breeders' association.

Beef cattle are grown in two ways, either fattened for market on the Western ranges, or shipped from the West to be fattened by Eastern farmers. All full-grown beef cattle are heavy and short-legged, so as to produce as much meat as possible. In breeding dairy cows large milk production has been the goal.

Almost all of our cattle breeds originated in Europe, and thrive best in a cool climate. For most cattle, like all dogs, have no sweat glands. They must cool themselves through their mouths, nostrils, and extended tongues.

But there is one breed of cattle which, like man, does perspire through its body, and so is well adapted to the warm weather found in the South. This is the Brahma, which was originally the humpback "sacred cow" of India. This breed has been successfully crossed with high-grade cattle of European producing new hybrids which do not suffer from excessive heat. These new breeds have largely replaced the oldtime Texas longhorns as beef animals on the Western range."

Taken from Perhaps I'll Be A Farmer by Ray Bethers

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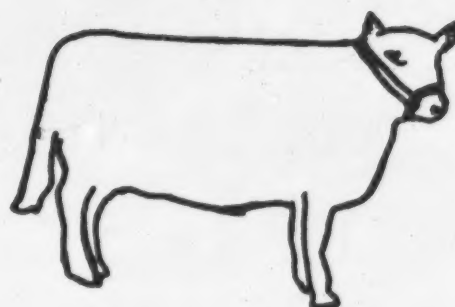
Guernsey Bull (Dairy)



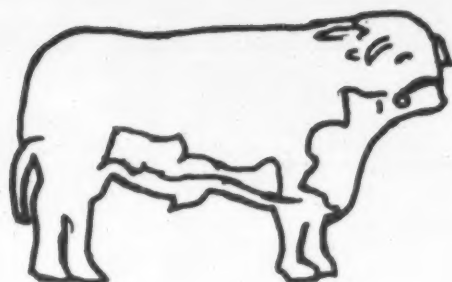
Jersey Cow (Dairy)



Milking Shorthorn Cow
(Dual Purpose)



Aberdeen-Angus Cow
(Beef)

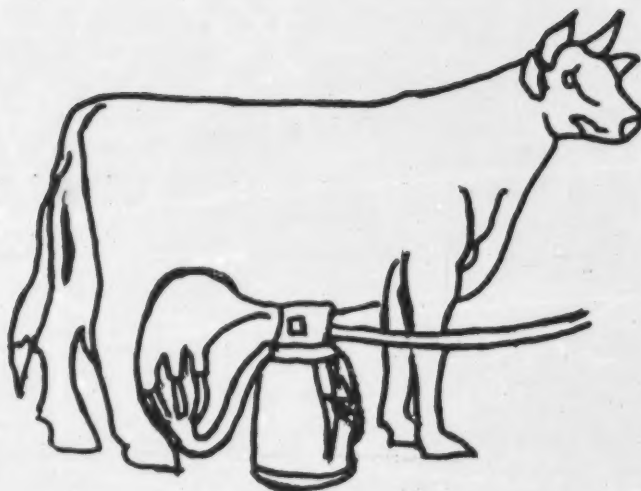


Hereford Bull (Beef)



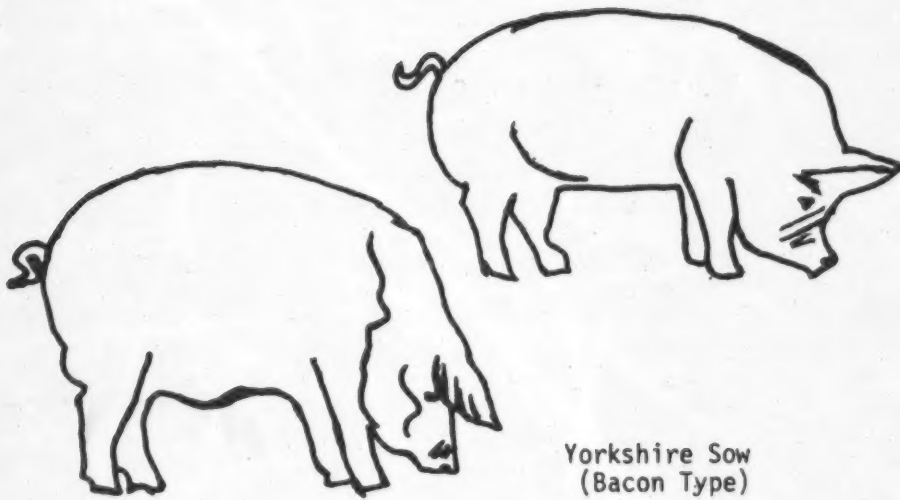
Brahma Bull (Beef)

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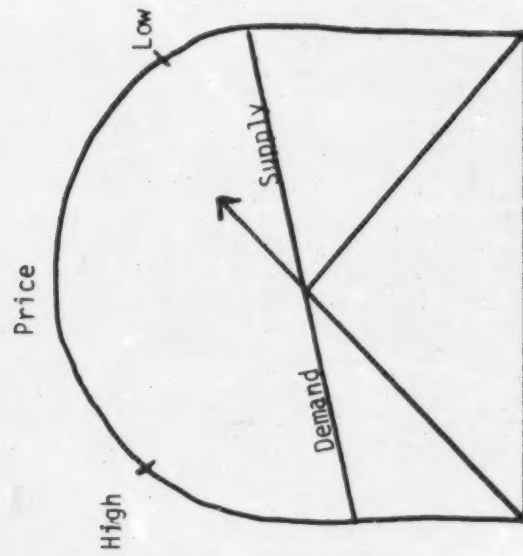
MOST LARGE FARMS USE MILKING MACHINES

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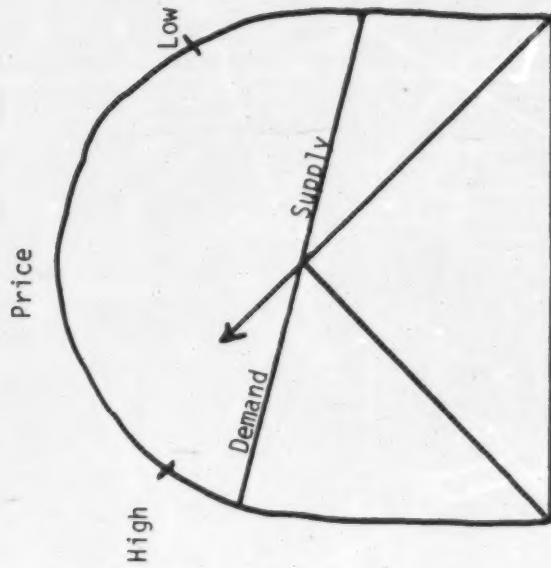


Spotted Poland China Bear
(Lard Type)

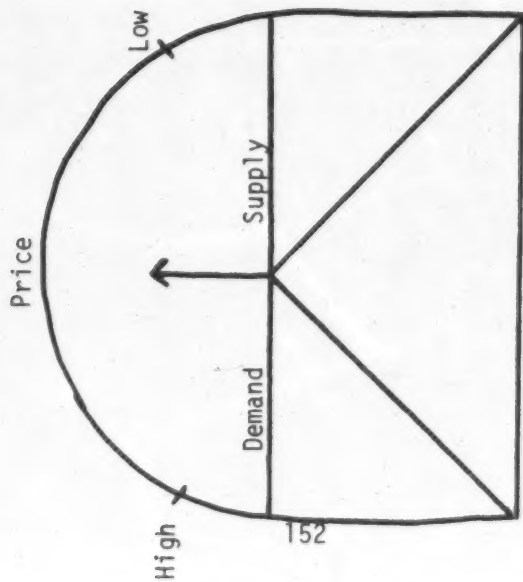
Yorkshire Sow
(Bacon Type)



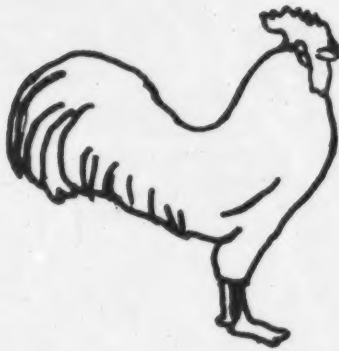
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SUPPLY AND DEMAND



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WHITE LEGHORN ROOSTER



WHITE LEGHORN HEN



SILVER LACED
WYANDOTTE ROOSTER



RHODE ISLAND
RED HEN

Chickens and Egg Production

"While most farmers keep a few chickens, large-scale chicken and egg production has now become almost a factory operation.

Chickens raised in this new way spend their entire lives in wire cages, their feet never touching the ground. Cleaning trays are underneath, food is just outside the cages, and the eggs roll down slanted runways.

Some hens, by this method, had laid more than 300 eggs in one year. This is indeed a great change from the familiar chicken-year."

Taken from Perhaps I'll Be A Farmer by Ray Bethers.